

# **EXHIBIT 4**

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1 UNITED STATES DISTRICT COURT

2 EASTERN DISTRICT OF MICHIGAN

3 SOUTHERN DIVISION

4 LEAGUE OF WOMEN VOTERS OF

5 MICHIGAN, ROGER J. BRDAK,

6 FREDERICK C. DURHAL, JR., JACK

7 E. ELLIS, DONNA E. FARRIS, Case No. 2:17-cv-14148-DPH-SDD

8 WILLIAM "BILL" J. GRASHA, ROSA

9 L. HOLLIDAY, DIANA L. KETOLA,

10 JON "JACK" G. LASALLE, RICHARD

11 "DICK" W. LONG, LORENZO RIVERA,

12 and RASHIDA H. TLAIB,

13 Plaintiffs,

14 vs

15 RUTH JOHNSON, in her official

16 capacity as Michigan Secretary

17 Of State,

18 Defendant.

19

20 DEPOSITION OF JOWEI CHEN,

21

22 Taken by the Defendants on Friday, September 7, 2018, at the

23 offices of Dickinson Wright, PLLC, 350 South Main Street,

24 Suite 300, Ann Arbor, Michigan, at 9:34 a.m.

25

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REPORTED BY: Ms. Marjorie Covey, CSR-2616

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1 Ann Arbor, Michigan  
2 September 7, 2018 - 9:34 a.m.  
3 THE REPORTER: Do you solemnly swear the testimony  
4 you are about to give will be the truth, the whole truth and  
5 nothing but the truth?  
6 MR. JOWIE CHEN: Yes.  
7 JOWIE CHEN,  
8 HAVING BEEN CALLED BY THE DEFENDANT AND SWORN:  
9 EXAMINATION  
10 BY MR. YEAGER:  
11 Q. Good morning, Professor Chen. How are you?  
12 A. Good morning, sir, I'm doing well.  
13 Q. I know you had your deposition taken before, I just want to  
14 make two points at the beginning. The court reporter will  
15 need a verbal response, not a nod or something like that to  
16 make the record clear. And if there is any questions that  
17 I'm asking that you are confused about, please ask me to  
18 clarify.  
19 Will you swear on that?  
20 A. Yes, sir.  
21 Q. Okay. Is there any reason, medications or otherwise that you  
22 can't testify fully or truthfully today?  
23 A. No, sir.  
24 (At 9:35 a.m. Exhibit 1 marked.)  
25 Q. Okay. If you could look at what's been marked as Chen

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21 IN THE TRANSCRIPT.)  
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1 Exhibit 1, please.  
2 Is that the report you entered in this case?  
3 A. It appears to be so, sir.  
4 Q. Okay. And on the first page you list the cases that you've  
5 previously been involved with, is that right, down at the  
6 bottom?  
7 A. Yes, sir.  
8 Q. Okay. Let's start with the cases that you provided trial  
9 testimony on.  
10 MR. YEAGER: Mike, if I could just interrupt. On  
11 the document there was an errata submitted after the report.  
12 I don't know if you have that.  
13 MR. CARVIN: I don't have it, but if it comes up in  
14 any way, that stipulation is on the record, and if there is  
15 typos or things like that, we'll -- please point it out.  
16 BY MR. CARVIN:  
17 Q. So let's start with this, if we could, City of Greensboro  
18 versus Guilford County Board of Elections.  
19 Was that a situation where they banned Greensboro  
20 from participating in referendum?  
21 A. I just want to see where you're starting -- you're going to  
22 the middle of the paragraph.  
23 Q. I'm going to the ones where I think you said you offered the  
24 trial testimony.  
25 A. I see. Let me get to where that starts.

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1 Q. Sure.  
2 **A. Okay. The first one listed was Raleigh Wake, but you want to**  
3 **ask about the City of Greensboro.**  
4 Q. Yes, please.  
5 **A. And if I could just ask you to repeat the question.**  
6 Q. What did the case involve?  
7 **A. I believe -- I recall that it was a challenge to a newly**  
8 **redrawn Greensboro City Council districting plan for the City**  
9 **of Greensboro.**  
10 **I think you had mentioned a referendum. I don't**  
11 **recall -- I don't recall or don't know about that. But I**  
12 **recall that the case, to my recollection the case involved**  
13 **the Greensboro City Council districting plan and that was**  
14 **redrawn.**  
15 Q. And what was the alleged flaw in the city council  
16 redistricting plan?  
17 **A. My recollection, to the best of my knowledge, is that**  
18 **plaintiffs were arguing a violation of one-person one-vote of**  
19 **some sort. And plaintiffs were alleging that it had been**  
20 **done -- the violation of one-person one-vote had been done in**  
21 **a partisan and racial manner. That's my recollection.**  
22 Q. Now maybe to refresh your recollection, that was the issue in  
23 the Wake County case, the Raleigh Wake Citizens v Wake  
24 County, right? They argued they were underpopulated on a  
25 racial and political basis?

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1 **A. That is my recollection. I believe that plaintiffs were**  
2 **making a similar argument regarding one-person one-vote done**  
3 **in a partisan racial manner.**  
4 Q. Okay. And what was your testimony in that case?  
5 **A. I -- you're asking now about Raleigh Wake County?**  
6 Q. No. No. I'm sorry. I'm trying to keep this clear.  
7 No. I've been asking about City of Greensboro.  
8 **A. The Greensboro case, okay, I'll go back to the Greensboro**  
9 **case.**  
10 **Let me try and remember as best as I can. I just**  
11 **want to qualify it was sometime ago, but I'll do my best**  
12 **here.**  
13 **I ran an expert report in that case where I**  
14 **analyzed the, number one, the population disparities; number**  
15 **two, the partisanship; and then number three, the racial**  
16 **composition of the districts in the enacted plan.**  
17 **I compared those various numbers in various ways to**  
18 **a few hundred computer simulations that I did of Greensboro**  
19 **City Council districting plans. The computer produced**  
20 **districting plans for Greensboro.**  
21 **And I reported on the differences that I saw**  
22 **between the computer-simulated plans and the enacted city**  
23 **council plans on those various measures.**  
24 Q. With respect to its partisan outcome, did you analyze,  
25 compare the enacted plan to the simulations in terms of the

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1 efficiency gap or the mean-median difference -- median-mean  
2 difference?  
3 **A. Let me try and remember. And again, I'm just going to**  
4 **qualify, I'm going to do the best I can to remember, but it's**  
5 **been awhile.**  
6 MR. YEAGER: Objection.  
7 Don't guess. You can testify.  
8 THE WITNESS: My recollection is that I analyzed  
9 the districts, both the enacted districts and the computer  
10 simulated districts in terms of partisanship just by counting  
11 up the number of districts and identifying districts as  
12 either Republican leaning or Democratic leaning.  
13 My recollection is I did not attempt to calculate  
14 an efficiency gap for any of those plans.  
15 I think you asked me about something other than  
16 efficiency gap. Did I miss something else?  
17 BY MR. CARVIN:  
18 Q. Median-mean --  
19 **A. Median-mean, thank you.**  
20 **I'm not going to guess, I'm just going to admit**  
21 **that I can't remember precisely.**  
22 Q. Okay.  
23 **A. I just can't remember everything that I did.**  
24 **I recall that I definitely calculated the number of**  
25 **Republican districts; and I might have, and I might not have**

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1 **reported on, say, the median district partisanship. So I**  
2 **just can't recall specifically doing that.**  
3 Q. All right. Well let's switch to Wake County, the Raleigh  
4 Wake Citizens case.  
5 As I understand what you told me a moment ago you  
6 did the same kind of analysis of the population differences  
7 and whether that reflected partisan differences?  
8 **A. Yes, sir. I did the same fundamental sort of analysis as I**  
9 **just described a moment ago.**  
10 Q. Including comparing it to simulated plans?  
11 **A. Yes, sir.**  
12 Q. Okay. And in that case, do you recall whether or not one of  
13 your measures of the partisan outcome was either the  
14 efficiency gap or the mean -- median-mean difference?  
15 **A. Okay. Again, I'm going to qualify that I'll do the best I**  
16 **can to remember. This was, I think it was a case in 2015 so**  
17 **it's been awhile.**  
18 **My recollection is that I did not calculate the**  
19 **efficiency gap. It's possible that I calculated the median**  
20 **district in some way using partisanship numbers. I don't**  
21 **specifically recall doing that, so I'm not going to say for**  
22 **sure that I did or did not. I don't specifically recall**  
23 **doing so with respect to the mean-median.**  
24 **But I definitely recall that I did not calculate**  
25 **the efficiency gap of either the enacted plan -- let me go**

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1 back and qualify.

2 When I say enacted plan, we're actually talking  
3 about two different enacted plans in that case that I  
4 analyzed. So what I'm saying applies to both of them. I  
5 don't recall analyzing or calculating an efficiency gap for  
6 either of those enacted plans.

7 And I can't recall specifically calculating a  
8 mean-median. I'm not going to say for sure that I didn't  
9 calculate something like the median.

10 Q. Okay. And then let's switch to League of Women Voters versus  
11 the Commonwealth of Pennsylvania, that's more recent.

12 Did you do an analysis essentially similar to what  
13 you did in this case?

14 A. I wouldn't call it essentially similar. I mean obviously  
15 there were differences. But I'll characterize it kind of  
16 briefly, and hopefully that will answer your question.

17 In this -- in the Pennsylvania case, I analyzed the  
18 enacted Congressional map in Pennsylvania. I analyzed it on  
19 partisan -- on various partisan measures. And then I  
20 performed some number of, I think several hundred  
21 computer-simulated plans. And I compared the partisan  
22 numbers, the partisan calculations of the simulated plans to  
23 the enacted plan.

24 Q. In Pennsylvania did you run a second set of simulated plans  
25 that were designed to protect incumbents?

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1 boundaries of a single district.

2 So if there were two incumbents within a district,  
3 that would be double pairing. I guess if there were three,  
4 maybe we would call that triple pairing. But the point is  
5 that the algorithm was trying to intentionally avoid or  
6 minimize that from happening.

7 Q. You have not run any such analysis here in this case,  
8 correct?

9 A. In the Michigan -- in my analysis of the Michigan plans? And  
10 that is correct. I have not done a comparable analysis on  
11 Michigan plans.

12 Q. Why not?

13 A. You're asking me about my expert report now?

14 Q. Right.

15 A. You're asking me why I didn't do an analysis of that sort of  
16 double pairing, double bunking, double pairing avoidance.

17 And the answer is that, number one, Plaintiffs'  
18 counsel did not ask me to do such an analysis; and number  
19 two, I read the statutory criteria, and I reference those in  
20 my report, MCL 4.261 and 3.63, and they do not reference that  
21 as a redistricting goal.

22 Q. And it's your understanding of the statutory criteria that  
23 they're exhaustive?

24 A. That is my understanding.

25 Q. So if they don't reference avoiding pairing of incumbents,

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1 A. My recollection is that, yes, I did a second set. I can't  
2 remember if it was labeled as the first or the second. But I  
3 recall doing a set of simulations that did protect incumbents  
4 in the following sense, and I'm just going to explain what I  
5 meant when I said protect incumbents.

6 In that particular case, I was given, I believe,  
7 the residential addresses of incumbents, of incumbent  
8 politicians at some point in time. And I determined what  
9 sort of plans would minimize the number of incumbents that  
10 were double paired into a single district.

11 So that is the sense in which I mean protecting  
12 incumbents.

13 Q. Just so I'm clear, you used the phrase double paired; if two  
14 incumbents are placed in one district, would that be what you  
15 would characterize as doubled paired?

16 A. That is what I -- that is how I operationalized it. I  
17 understand that that's not necessarily the only way that that  
18 term is used. But I'm just talking about how I  
19 operationalized the term in my report in that case.

20 So I think you characterized it correctly there. I  
21 sought to analyze what sort of districting algorithm -- or  
22 what sort of districting plans would emerge from an algorithm  
23 that made a conscious effort that intentionally tried to  
24 minimize putting two or more incumbent addresses, residential  
25 addresses, into the geographic -- within the geographic

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1 then it would be inconsistent or violative of those statutory  
2 criteria for a redistricting plan to avoid pairing  
3 incumbents?

4 A. That is a legal judgement that I'm not qualified to opine on.

5 All I was saying a moment ago is that my  
6 understanding is that the statutory criteria do not call for  
7 explicitly attempting to protect incumbents.

8 Q. We'll get into this in more detail, but as I understand your  
9 report, your understanding is that the listed criteria are  
10 the exhaustive criteria, the only ones that can be considered  
11 by those drawing plans in Michigan, is that correct?

12 A. Okay. I'm just going to clarify that I understand that to be  
13 two possibly different questions so I'm going to take them  
14 one at a time.

15 So I'm just going to tell you what I understand to  
16 mean by the question first. And then I'll answer the  
17 questions so that there is no ambiguity about what I'm trying  
18 to answer here.

19 When I understood the term exhaustive, all I meant  
20 for that -- all I meant is that I understood that I was going  
21 to operationalize and conduct analysis using only an  
22 exhaustive list of criteria.

23 I don't understand -- now the second part of your  
24 question contained the word can, and that possibly -- I'm not  
25 sure what you mean by that question. It might mean in a

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1 legal sense whether it's legally permissible. And of course  
2 on that I'm not at all qualified to opine as to what the  
3 legal meaning might be in this case.  
4 I am just telling you that I read the criteria, the  
5 statutory criteria, I had conversations with Plaintiffs'  
6 counsel, and I understood by the question put forth to me to  
7 be to analyze the sort of plans that would emerge if I had --  
8 if I analyzed an exhaustive list of criteria.  
9 So that's all I meant when I answered your earlier  
10 question.  
11 Q. And to be clear the exhausted list of criteria are those  
12 referenced in the two statutes that you referred to earlier?  
13 A. Yeah. That's correct. I'm following the criteria that I  
14 read, that I saw listed in the -- in those two statutes.  
15 Q. Do you have any understanding as to whether or not it would  
16 be permissible under those statutes to consider nonpartisan  
17 criteria other than those explicitly listed in the statutes?  
18 A. If you mean admissible in any legal sense, again I'm going to  
19 give the same answer which is that I'm not qualified to tell  
20 you whether it's legally permissible.  
21 Q. Okay.  
22 A. I can tell you how I took those criteria and I built them  
23 into my own computer simulation, so I can tell you whether  
24 they were permissible in a computer simulation in that sort  
25 of technical sense.

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1 And as you know, I did not explicitly consider, I  
2 didn't build in any partisan considerations. I instructed  
3 the computer to ignore partisan considerations.  
4 Q. I'm talking about nonpartisan considerations.  
5 A. I'm sorry, I misheard you. I apologize.  
6 Q. For example, avoiding pairing of incumbents, is it your  
7 understanding that under the statutory criteria that would be  
8 a permissible, traditional districting principle that would  
9 be acceptable under the criteria as enumerated in the  
10 statute?  
11 A. Okay, I got you, I heard your question this time. I  
12 apologize for that.  
13 So I'm going to give the same answer as before  
14 which is that if you're asking permissible in any legal  
15 sense, I obviously can't tell you whether or not the statute  
16 is to be interpreted as making something legally or not  
17 legally permissible. So I can't give you an opinion with  
18 respect to the legality, the legal permissibility of a  
19 nonpartisan criteria.  
20 I can tell you only about the analysis that I did,  
21 which is that I obviously did not make it permissible for my  
22 computer, for my simulation plans to be drawn with respect to  
23 a nonpartisan criterion like avoiding the pairing of  
24 incumbents.  
25 So I just want to make that distinction.

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1 Q. That's fine. And in Pennsylvania did you use a compactness  
2 measure known as Polsby-Popper?  
3 A. My recollection -- I don't have the report in front of me so  
4 I'm going to do my best to remember.  
5 My recollection is that I did. That's my best  
6 recollection.  
7 Q. Did you use Polsby-Popper as a measure of compactness in this  
8 case?  
9 A. My recollection is that I did not analyze Polsby-Popper  
10 measures in my report.  
11 Q. Why not?  
12 A. Well, I analyzed two different measures in my report here.  
13 I calculated the Reock score, which is probably a  
14 very common, perhaps the most common -- I'm not really saying  
15 it's definitely the most common, but it's certainly a very  
16 common measure of compactness.  
17 And on top of that, I found in reading the statute,  
18 that the statutes give what seems to be a precise definition,  
19 Michigan specific definition, or a method of calculating the  
20 compactness of quantifying the compactness of districts.  
21 And so I placed -- because I saw that in the  
22 statute, I placed some greater importance on trying to, at  
23 least try to follow that calculation or that method of  
24 quantifying compactness that I read in the statute.  
25 So if you're asking -- I think you're asking about

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1 why didn't I do it in Michigan whereas I did in Pennsylvania.  
2 And the answer is I had, in Michigan, I had in  
3 front of me a statute that laid out a, what to me was a  
4 pretty specific quantifiable definition of compactness;  
5 whereas in Pennsylvania, I didn't have such a specific --  
6 such a specific definition put forth to me.  
7 Q. In addition to the statutory specific definition of  
8 compactness, which I'll call the circumscribed circle test,  
9 in Michigan you also analyzed compactness under the Reock  
10 test, correct?  
11 A. Yes, sir.  
12 Q. Why did you use a measure of compactness in addition to the  
13 ones specified in the statute?  
14 A. It's just something that I commonly do. It's not necessarily  
15 something that I thought was based on the statute  
16 specifically, but certainly it's been my experience that,  
17 number one, compactness is a traditional districting  
18 criterion, and so very commonly I'll use Reock as a measure.  
19 So it's just because I've done it by practice.  
20 Q. But you've also used Polsby-Popper, and why did you Reock and  
21 not do Polsby-Popper in this case?  
22 A. I could well have, but I think that in general I use  
23 Polsby-Popper a bit less commonly. So it's by practice that  
24 I included the Reock measure.  
25 Q. Do you recall that you used the median-mean measure of

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1 partisan bias in Pennsylvania?  
2 **A. It's my recollection that I did include some calculations of**  
3 **mean-median gap -- or I think I called it mean-median**  
4 **difference --**  
5 Q. Okay.  
6 **A. -- in my Pennsylvania report.**  
7 Q. All right. And did you use any efficiency gap measures of  
8 partisan bias in Pennsylvania?  
9 **A. Efficiency gap measures of partisan bias is what you asked**  
10 **about?**  
11 Q. Yes.  
12 **A. I'm going to do my best to try to remember. I'll qualify by**  
13 **saying it's been awhile since I have looked at that report.**  
14 **My best recollection right now is that I did, but**  
15 **I'm just trying to do my best to remember.**  
16 Q. So your best recollection is that you did do an efficiency  
17 gap analysis in the Pennsylvania case?  
18 **A. That's my best recollection right now.**  
19 Q. Okay. And in --  
20 **A. And again I'm just qualifying that it's been awhile since I**  
21 **looked at that report.**  
22 Q. Okay. And North Carolina Rucho?  
23 **A. The Rucho case?**  
24 Q. Yes.  
25 **A. Yes, sir.**

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1 Q. In that case, did you run simulations that factored in  
2 incumbency protection?  
3 **A. Let me try to remember.**  
4 **My recollection is that in my report in the Rucho**  
5 **case, I conducted several different sets of simulations. I**  
6 **recall I conducted a first set of simulations that, in**  
7 **addition to following traditional redistricting criteria that**  
8 **were set forth in the adopted criteria that the legislature**  
9 **had, I did not program the simulation algorithm in that first**  
10 **set to take into consideration the location of incumbents or**  
11 **any sort of incumbent protection.**  
12 **So that was one set of simulations that I analyzed**  
13 **in the report.**  
14 **I recall that there was another set of simulations**  
15 **that, in addition to the nonpartisan traditional districting**  
16 **criteria, did in fact explicitly attempt to maximize the**  
17 **number of single -- or isolated incumbents. In other words**  
18 **it tried to minimize double or triple pairing of incumbents,**  
19 **tried to separate out incumbents into separate -- into**  
20 **separates districts without pairing or triple pairing -- or**  
21 **tripling any incumbents into a single district.**  
22 **So I took two different approaches there. And**  
23 **that's my best recollection.**  
24 **So again I just want to qualify that when I say**  
25 **protecting incumbents, what I actually did was to avoid**

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1 **double pairing.**  
2 Q. And did you do a mean-median difference analysis of partisan  
3 bias?  
4 **A. I'm going to try to remember as best I can, I'm going to**  
5 **qualify again by saying it's been a while.**  
6 Q. That can be a running stipulation, but go ahead.  
7 **A. I'm going to do my best here.**  
8 **My best recollection right now is that I did not**  
9 **report on the mean-median. That's to the best of my**  
10 **recollection.**  
11 Q. And how about the efficiency gap?  
12 **A. My recollection is that I did calculate the efficiency gap of**  
13 **the enacted and in some simulated plans in that report.**  
14 **I'm not recalling that I calculated the efficiency**  
15 **gap for all the simulation, for all sets of simulations. But**  
16 **I do recall doing that calculation for some simulations and**  
17 **perhaps not for others.**  
18 **That's the best of my recollection.**  
19 Q. Do you have any decisional criteria or policy about when  
20 you'll use the mean-median difference and when you will use  
21 the efficiency gap?  
22 **A. I'm not sure exactly what you mean by decisional criteria.**  
23 Q. Well is there -- I take it from your answers you don't always  
24 do both mean-median and efficiency gap, and I'm wondering if  
25 -- why you choose one over the other in certain

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1 circumstances.  
2 **A. Oh, well in some cases I choose metrics because -- or I**  
3 **employ metrics because I'm trying to respond to questions**  
4 **that are put forth to me by counsel. So that certainly is**  
5 **part of how I decide what metrics to use. It depends on what**  
6 **questions are put forth to me.**  
7 Q. So you'll use the measure of partisan bias suggested to you  
8 by the Plaintiffs' counsel?  
9 **A. Well I try to answer questions that are put forth to me. And**  
10 **if those questions are answerable by metrics that I find to**  
11 **be appropriate, then I will do so.**  
12 **Certainly it's not the case that I will employ a**  
13 **particular metric simply because a lawyer tells me to do so.**  
14 **But if a lawyer asks me to answer a question, that I believe**  
15 **can be answered by an appropriate measure, then I'll**  
16 **certainly do so, or at least evaluate the feasibility of**  
17 **doing so.**  
18 **And I would add on top of that, I guess, that**  
19 **certainly it's not been the case that all of these measures**  
20 **have been -- have been widely used or even known by me during**  
21 **my entire career of writing -- or my entire period of writing**  
22 **expert reports. And certainly the efficiency gap is one**  
23 **example of that.**  
24 Q. Of what?  
25 **A. Oh, of a measure not being available to me.**

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1 For example, in 2013 I wrote an expert report in  
2 which I didn't use the efficiency gap because there had been  
3 no academic literature in political science really discussing  
4 the efficiency gap. So I just wasn't even aware of the  
5 formula back then.  
6 So that's just an example of what might go into my  
7 decision making.  
8 Q. What about since Stephanopolous and McGhee articulated the  
9 efficiency gap in the Chicago Law Review and elsewhere, was  
10 it known to you then?  
11 A. You mean when that article was written, was it then known to  
12 me?  
13 Q. Yes.  
14 A. Well I was generally aware that the article was being  
15 published, so of course I was aware of generally what they  
16 were describing in that article.  
17 Q. Okay. And then the rest of these cases -- I'm going to try  
18 to get through this as quickly as I can.  
19 There is about three cases if you look at page one  
20 where the, that are in Florida where Detzner is the  
21 defendant, okay? For example, it says --  
22 A. Yes.  
23 Q. -- Romo v Detzner, League of Women v Detzner. I believe  
24 there is one other.  
25 Are those all the same cases, or are those

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1 different cases?  
2 A. Okay. You're talking about Rene Romo versus Detzner and then  
3 League of Women Voters versus Detzner.  
4 Q. Right.  
5 A. Okay. My recollection is that those were different cases.  
6 Those were different districting plans that were being  
7 challenged.  
8 Q. And what was the difference?  
9 A. Let me try and remember. Those two cases in fact do have  
10 similar names so I'm going to try to keep it straight here.  
11 I believe, I'm going to try my best here, to my  
12 recollection, the Rene Romo versus Detzner case was a  
13 challenge of Florida's then enacted -- then just enacted  
14 congressional districting plan. And then my recollection is  
15 that the League of Women Voters versus -- of Florida versus  
16 Detzner case was a challenge to the then enacted Senate --  
17 State Senate plan.  
18 Q. And how about Corrine Brown v Detzner?  
19 A. Okay. I see that one. I believe that that was a case in  
20 which Congresswomen Brown challenged the -- challenged  
21 something to do with a specific -- a specific congressional  
22 district or a set of congressional district lines that  
23 obviously involved her congressional district. So it was a  
24 congressional challenge.  
25 I don't recall it being -- I don't believe it was a

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1 statewide challenge.  
2 Q. Okay. Well let's start with Romo, did you testify on behalf  
3 of the plaintiffs in that case?  
4 A. I was deposed, I did not testify at trial.  
5 Q. But did you appear on behalf of the plaintiffs?  
6 A. Did I --  
7 Q. Did you offer a report for the plaintiffs?  
8 A. I authored a report, yes, sir. Sorry.  
9 Q. What was the gist of that report?  
10 A. Okay. That was a report in which I had conducted a number  
11 of -- first I had evaluated the enacted plan in terms of  
12 partisan, its partisanship. And then I had analyzed a number  
13 of various sets of computer-simulated plans that were  
14 simulating Florida's congressional districting planning and I  
15 evaluated the partisanship of those.  
16 Q. And how about the League of Women Voters, what was the gist  
17 of your report in that case?  
18 A. In the League of Women Voters versus Detzner case, I analyzed  
19 the partisanship and the racial composition of various -- I  
20 believe I analyzed the partisan composition of the entire  
21 Senate plan. I analyzed the racial composition of various  
22 districts.  
23 And then I performed some number of simulations, I  
24 believe more than one set of simulations using differing --  
25 differing configurations of districts that were held frozen.

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1 And I analyzed the partisanship, and I recall that  
2 I analyzed the partisanship of those simulated plans.  
3 Q. Okay. And then in Brown?  
4 A. In the Corrine Brown versus Detzner case -- you're asking  
5 what I did in my report, right?  
6 Q. Yes.  
7 A. Okay. I believe I wrote one report, that's my recollection.  
8 And in that report I produced data looking at the  
9 partisanship -- I believe using, looking at the voter --  
10 using the voter registration files looking at the  
11 partisanship, and possibly the racial composition of one or  
12 more congressional districts.  
13 Q. Did you run any simulated plans in that report?  
14 A. I did not produce any computer-simulated plans.  
15 Q. And in all of those cases the plaintiffs were challenging a  
16 redistricting plan enacted by a Republican legislature?  
17 A. To the best of my knowledge, the Florida legislature was  
18 Republican -- was unified Republican controlled during the  
19 time of redistricting at the beginning of this decade.  
20 So I believe that is an accurate characterization,  
21 to the best of my knowledge.  
22 Q. And the plaintiffs in Romo and League of Women Voters were  
23 alleging that the Republicans had engaged in an  
24 antidemocratic gerrymander, correct?  
25 A. I can't speak to that. I can tell you that the plaintiffs



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1 were challenging districting plans that had been enacted.  
2 Q. On what grounds?  
3 A. Which case are we talking about now?  
4 Q. I'm trying to put together Romo and League of Women Voters.  
5 A. Okay.  
6 Q. If there is a difference, let me know.  
7 A. There might be, I am not sure. I'll have to think about  
8 this.  
9 My best -- to the best of my knowledge, Romo was  
10 purely a partisan challenge. To my knowledge, I don't -- I'm  
11 not aware of the Romo plaintiffs alleging racial  
12 gerrymandering.  
13 Q. How about League of Women Voters?  
14 A. To the extent that I'm aware, I'm not aware of the League of  
15 Women Voters of Florida alleging anything other than a  
16 partisan bias in the redistricting. I'm not aware, for  
17 example, that they made a racial challenge.  
18 Q. Just to be clear, they were alleging a partisan bias against  
19 Democrats?  
20 A. I'm not sure that they characterized it that way. And I'm  
21 just not going to speak for the League of Women Voters,  
22 plaintiffs.  
23 Q. Which party was disadvantaged according to the plaintiffs in  
24 the League of Women Voters, Democrats or Republicans?  
25 A. Well I can tell you about my findings. And certainly I

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1 analyzed things in terms of a Republican or Democratic bias.  
2 And I'm happy to characterize my own findings as there being  
3 a partisan bias that favored the Republicans.  
4 Q. Okay.  
5 A. I'm just saying -- all I'm doing is I'm saying I'm not going  
6 to speak for the plaintiffs themselves.  
7 Q. Have you ever been involved in a case where you allege that  
8 there was a partisan bias in favor of Democrats?  
9 A. If I could ask you to repeat the question.  
10 Q. Have you ever been involved in a case where you concluded or  
11 alleged that there was a partisan bias in favor of Democrats?  
12 A. I can't recall doing that.  
13 Q. Okay. And you're a Democrat?  
14 A. You're asking about me personally?  
15 Q. Yes.  
16 A. I'm not.  
17 Q. You are not a registered Democrat?  
18 A. My understanding is that in Michigan we don't have partisan  
19 registration.  
20 We don't have -- my understanding is that Michigan  
21 does not allow voters to register as a member of a particular  
22 party.  
23 Q. Would you align yourself with the Democratic or Republican  
24 party in your voting practices?  
25 A. Neither.

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1 Q. Okay. Georgia State Conference of the NAACP versus State of  
2 Georgia, that's a 2017 case --  
3 A. Well --  
4 MR. YEAGER: Wait, let him ask a question.  
5 MR. CARVIN: That's fair.  
6 THE WITNESS: I see that case.  
7 MR. YEAGER: Wait, Jowie, let him ask the question,  
8 then you answer.  
9 BY MR. CARVIN:  
10 Q. I take it from the pause that you have seen this case listed  
11 now on page one of your report, correct?  
12 A. Yes, sir.  
13 Q. Okay. So now, what was the issue in that case, and what was  
14 the gist of whatever report you authored in that case?  
15 A. Okay. Sure.  
16 To my knowledge, that case is one in which  
17 plaintiffs are challenging the drawing of two State House  
18 districts, District 105 and 111, in Georgia's state  
19 legislature, State House.  
20 Q. And on what grounds are they challenging that?  
21 A. I'm going to do my best to answer the question. I think this  
22 is part of the dispute in that case so I'm just going to do  
23 my best to -- and I'm not legally qualified to accurately  
24 characterize these sort of cases.  
25 But my understanding is that the plaintiffs are

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1 alleging racial considerations in the drawing of House  
2 Districts 105 and 111.  
3 Q. And what, if anything, have you analyzed in that case?  
4 A. I conducted analysis of the voting patterns in those two  
5 districts, which are parts of Gwinett County and Henry  
6 County.  
7 I looked at voter registration numbers and analyzed  
8 voting patterns in terms of candidates preferred, as well as  
9 racial -- the racial composition of the electorate, of the  
10 turnout of the electorate.  
11 And I performed a model -- I may have used the term  
12 simulations, but it's still in the sense that I've been  
13 discussing simulations here, a model predicting what would  
14 have happened in a hypothetical district using voter  
15 registration records.  
16 Q. And what was your conclusion?  
17 A. In general my conclusion was that had the two districts that  
18 were being challenged, 105 and 111, had they not been redrawn  
19 in the way that they were in the middle of the decade, that  
20 the election outcomes may well have been different than they  
21 actually were.  
22 Q. Different in terms of party or --  
23 A. Different in terms of the candidate who won.  
24 Q. And were you analyzing whether that candidate was the  
25 preferred candidate of choice of the black community?

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1 **A. I did. I analyzed racially polarized voting --**  
2 Q. Right.  
3 **A. -- in my report.**  
4 Q. And your conclusion was that prior to the re-draw, the black  
5 preferred candidate would have been successful; but after the  
6 re-draw, he would not have been, or she would not have been?  
7 **A. That was generally my conclusion.**  
8 Q. Okay. And where is that at this point? Has there been a  
9 trial?  
10 **A. That case, to my knowledge, has not gone to trial.**  
11 Q. Okay. Have you submitted a report?  
12 **A. I have. I wrote a report.**  
13 Q. Have you been deposed?  
14 **A. I have.**  
15 Q. Okay. And NAACP versus St. Louis?  
16 **A. Actually let me just make sure that my report was correct in**  
17 **describing my involvement in that case.**  
18 **So I listed that Georgia case as one in which I've**  
19 **written an expert report, and as I said, I've been deposed,**  
20 **but have not -- did not -- there has been no trial in which I**  
21 **have testified in that case.**  
22 **I just wanted to make sure I was describing that**  
23 **accurately.**  
24 Q. Okay. And then at the very top you have Missouri National  
25 Association for the Advancement of Colored People versus

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1 object to the extent that the question requires him to  
2 disclose conversations with counsel that would be protected  
3 by Rule 26 and Work Product Doctrine.  
4 You may answer.  
5 THE WITNESS: My recollection is that what I'm  
6 referring to in this footnote, and when I'm saying  
7 alternative maps, I'm talking about the simulated plans that  
8 I produced in this report.  
9 BY MR. CARVIN:  
10 Q. So you draft a footnote, you're referring to all 3000  
11 simulated plans?  
12 **A. That's my recollection of what I meant by that phrase, by**  
13 **that footnote.**  
14 Q. Did you ever prepare one map for Congress, one map for  
15 Senate, and one map for the House, by yourself?  
16 **A. Oh, by hand? Personally?**  
17 Q. No. Did you either select among the thousand or create your  
18 own map?  
19 **A. Well --**  
20 MR. YEAGER: Okay, wait. Just wait.  
21 I'm going to object. We'll have to go through this  
22 a little bit at a time.  
23 The witness is instructed not to testify as to his  
24 conversations with counsel, which are protected by Rule 26  
25 and the Work Product Doctrine, or other work that he did

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1 Ferguson and St. Louis County Board, and that was in 2014.  
2 Do you see that case?  
3 **A. Yes, sir.**  
4 Q. Okay. And what was your analysis -- what issues did you  
5 analyze in that case?  
6 **A. I was a co-author on a, I believe it was a rebuttal report in**  
7 **which I helped to -- I did some statistical analysis in which**  
8 **I helped to analyze, I recall, the racial composition of a**  
9 **districting plan that I believe had been proposed.**  
10 **That's all that I can specifically remember being**  
11 **my work in that case.**  
12 Q. Was the issue again racial block voting?  
13 **A. I'm not sure I know enough to characterize it as that, but I**  
14 **do recall it involved racial issues.**  
15 Q. Okay. If you could turn to the second page of your report,  
16 please. I'd like to direct your attention to footnote one.  
17 **A. Yes, sir.**  
18 Q. Okay. You say here, you reviewed the statutory criteria and  
19 applied the criterion mandated in these statutes to produce a  
20 set of alternative maps for Michigan's Congressional, Senate  
21 and House districting plans.  
22 To your knowledge are those the plans that were  
23 attached to Plaintiffs' complaint in this case?  
24 **A. Let me just review where I -- where this footnote starts.**  
25 MR. YEAGER: While he's reviewing, I'm going to

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1 that's not reflected in his report for the same reason.  
2 THE WITNESS: Okay.  
3 MR. YEAGER: Go ahead. With that constraint,  
4 answer to the extent that you can.  
5 THE WITNESS: Okay. And I'm just going to ask you  
6 if you could please reask your question.  
7 BY MR. CARVIN:  
8 Q. Did you produce maps, individual maps to Plaintiffs' counsel  
9 and/or Professor Mayer?  
10 MR. YEAGER: Same objection and instruction.  
11 THE WITNESS: I'm going to follow Plaintiffs'  
12 counsel's instruction.  
13 BY MR. CARVIN:  
14 Q. No, you're going to answer the question.  
15 MR. YEAGER: Okay, hold on. Do you want to take a  
16 break and talk about this?  
17 MR. CARVIN: We can do it on the record. We can do  
18 it on the record.  
19 MR. YEAGER: Okay.  
20 MR. CARVIN: You attached three alternative maps to  
21 your complaint.  
22 MR. YEAGER: Yes.  
23 MR. CARVIN: Professor Mayer has already testified  
24 that Professor Chen drew those plans. He also testified that  
25 Professor Chen forwarded those plans to him.

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<p style="text-align: right;">Page 34</p> <p>1 You stated in the deposition that those were the</p> <p>2 plans that were attached to Plaintiffs' complaint.</p> <p>3 I'm simply trying to confirm that reality which is</p> <p>4 already out there and certainly can't be hidden from the</p> <p>5 Court.</p> <p>6 MR. YEAGER: Okay. First of all, if you want to</p> <p>7 play games about hiding things from the Court, that's clever,</p> <p>8 but not appropriate, number one.</p> <p>9 Number two, that -- you've not correctly summarized</p> <p>10 the prior testimony, I object to that.</p> <p>11 And number three, the witness is going to answer to</p> <p>12 the extent it's not protected, just as Professor Mayer did.</p> <p>13 Now if you want to narrow your question to</p> <p>14 something that is not protected, the witness will answer.</p> <p>15 MR. CARVIN: I'll go back to where I started.</p> <p>16 BY MR. CARVIN:</p> <p>17 Q. Are the maps that you -- are you aware of alternative maps</p> <p>18 being attached to Plaintiffs' complaint?</p> <p>19 <b>A. I am generally aware of that.</b></p> <p>20 Q. Did you prepare those maps?</p> <p>21 THE WITNESS: What are my instructions?</p> <p>22 MR. YEAGER: You can answer that yes or no, to the</p> <p>23 extent you know.</p> <p>24 THE WITNESS: Okay. The answer is that to the best</p> <p>25 of my recollection those plans were produced by computer</p>	<p style="text-align: right;">Page 36</p> <p>1 (At 10:20 a.m. went off the record.)</p> <p>2 (At 10:26 a.m. went on the record.)</p> <p>3 MR. CARVIN: Back on the record.</p> <p>4 BY MR. CARVIN:</p> <p>5 Q. Who chose the alternative maps that were attached to</p> <p>6 Plaintiffs' complaint?</p> <p>7 MR. YEAGER: You may answer that question, to the</p> <p>8 extent you know.</p> <p>9 THE WITNESS: My understanding is that Plaintiffs'</p> <p>10 counsel did.</p> <p>11 BY MR. CARVIN:</p> <p>12 Q. Okay. Did you have conversations with him about which map to</p> <p>13 choose?</p> <p>14 MR. YEAGER: You can answer that yes or no.</p> <p>15 THE WITNESS: I did not have conversations</p> <p>16 regarding what map they were going to choose.</p> <p>17 BY MR. CARVIN:</p> <p>18 Q. Did you play any role in selecting the map that was attached</p> <p>19 to the Plaintiffs' complaints?</p> <p>20 MR. YEAGER: You may answer that yes or no.</p> <p>21 THE WITNESS: Yes, I did.</p> <p>22 BY MR. CARVIN:</p> <p>23 Q. What was that role?</p> <p>24 MR. YEAGER: So I'm going to object to the extent</p> <p>25 that that would require you to disclose communications</p>
<p style="text-align: right;">Page 35</p> <p>1 simulations that I programmed.</p> <p>2 BY MR. CARVIN:</p> <p>3 Q. But there was only one map for each office attached to</p> <p>4 Plaintiffs' complaint, correct, not a thousand?</p> <p>5 <b>A. That is my understanding.</b></p> <p>6 Q. Okay. Did you select the one map for Congress, the one map</p> <p>7 for Senate, and the one map for the State House that was</p> <p>8 attached to the Plaintiff's complaint?</p> <p>9 MR. YEAGER: Objection.</p> <p>10 You can answer that yes or no.</p> <p>11 THE WITNESS: I did not make that selection.</p> <p>12 BY MR. CARVIN:</p> <p>13 Q. Did you -- well then I'm confused. They were -- you didn't</p> <p>14 select among the thousand?</p> <p>15 MR. YEAGER: You can answer that yes or no.</p> <p>16 THE WITNESS: I did not make the selection.</p> <p>17 BY MR. CARVIN:</p> <p>18 Q. Who made the selection?</p> <p>19 THE WITNESS: Can I answer the question?</p> <p>20 MR. YEAGER: Well the objection is the same</p> <p>21 objection about matters protected by Rule 26.</p> <p>22 I'd like to take a break and talk to the witness to</p> <p>23 find out what he knows and doesn't know, so that he can</p> <p>24 answer your question the best that he can.</p> <p>25 MR. CARVIN: All right.</p>	<p style="text-align: right;">Page 37</p> <p>1 between you and us; but to the extent that you can answer the</p> <p>2 question without referring to communications between us, you</p> <p>3 may answer the questions.</p> <p>4 Do you want to hear it back again?</p> <p>5 THE WITNESS: Please give me your instructions</p> <p>6 again.</p> <p>7 MR. YEAGER: Okay. You may answer the question to</p> <p>8 the extent it does not require you to disclose communications</p> <p>9 between you and Plaintiffs' counsel. To the extent it does</p> <p>10 not require a disclosure of the content of those</p> <p>11 communications, you may answer.</p> <p>12 THE WITNESS: I'm going to do my best to answer as</p> <p>13 much of the question as I can, while still following Mr.</p> <p>14 Yeager's instructions that he just gave to me. So I'm going</p> <p>15 to do my best to follow both of those things.</p> <p>16 So my answer is that I produced a number of</p> <p>17 computer-simulated plans.</p> <p>18 Now I can't answer any further without violating</p> <p>19 Mr. Yeager's instructions to me. So I'm going to follow Mr.</p> <p>20 Yeager's instructions to me by stopping right there.</p> <p>21 MR. YEAGER: And let me clarify my instruction in a</p> <p>22 way that might make this easier.</p> <p>23 To the extent that you could answer further without</p> <p>24 disclosing the content of communications between us, you may</p> <p>25 answer further.</p>

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1 THE WITNESS: I've answered as far as I can while  
2 still following Plaintiffs' counsel's instructions to me.  
3 BY MR. CARVIN:  
4 Q. Completely unacceptable.  
5 MR. CARVIN: I'll try it another way. I'll ask  
6 you, Mr. Yeager.  
7 Who produced the maps that you presented to the  
8 Court as part of your complaint?  
9 MR. YEAGER: Well I'm not going to be deposed in  
10 the deposition. I'm pleased to have that conversation with  
11 you, but we're not going to have it on the record in a  
12 deposition.  
13 MR. CARVIN: I'm not going --  
14 MR. YEAGER: And we can have that conversation  
15 right now if you prefer. We're not going to have it on the  
16 record in a deposition.  
17 MR. CARVIN: Okay. Let's go off the record for a  
18 minute.  
19 (At 10:30 a.m. went off the record.)  
20 (At 10:47 a.m. went on the record.)  
21 MR. CARVIN: Back on the record.  
22 BY MR. CARVIN:  
23 Q. I'm going to try to get through this without putting you in  
24 an awkward spot in terms of your communication with counsel.  
25 I'm not entirely sure where we left off when we were talking.

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1 So let me just ask you a couple of questions. To  
2 the extent you can answer them without referencing  
3 consultation with counsel, you can tell me -- you can tell me  
4 that you got that problem. But if you can answer it without  
5 referencing that, I'd appreciate it if you did. I think this  
6 will be clear once I ask the question.  
7 **A. Okay.**  
8 THE WITNESS: And if I could just ask, Mr. Yeager,  
9 are my instructions the same as before that I am not to  
10 reference -- are you instructing me not to answer any  
11 questions with reference to conversations with Plaintiffs'  
12 counsel.  
13 MR. YEAGER: Well we're going to go question by  
14 question. So let's just listen to the question --  
15 BY MR. CARVIN:  
16 Q. Mr. Yeager is right. I apologize for interrupting. I don't  
17 think this will be an issue as I --  
18 THE WITNESS: Or are my instructions to wait for  
19 you?  
20 MR. YEAGER: You have no instructions until you get  
21 a question; and then if instructions are needing to be given,  
22 you can count on me.  
23 THE WITNESS: Great.  
24 BY MR. CARVIN:  
25 Q. Okay. So did you play any role in selecting the alternative

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1 maps that were attached to the complaint?  
2 MR. YEAGER: You can answer that question.  
3 THE WITNESS: I produced a number of simulated  
4 maps.  
5 BY MR. CARVIN:  
6 Q. Okay. In your report obviously you produced -- let's use  
7 Congress as an example, you produced a thousand alternative  
8 maps for Congress?  
9 **A. Yes, sir.**  
10 Q. Is that, when you say you produced a number are those the  
11 maps you're referring to?  
12 **A. Yes.**  
13 Q. Okay. One map was attached to the complaint. Do you know --  
14 **A. Oh, let me actually go back and clarify my answer if I could.**  
15 MR. YEAGER: Go ahead.  
16 THE WITNESS: So you are correct in that I produced  
17 one thousand congressional maps and obviously one thousand  
18 Senate maps and one thousand House maps.  
19 Even before, I recall as early as 2016, I had  
20 already -- I had already produced a, also a number of maps, I  
21 recall of the House and Senate plans. I don't recall the  
22 Congressional plans. But I had produced already a large  
23 number of House and Senate maps.  
24 BY MR. CARVIN:  
25 Q. In connection with this litigation?

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1 **A. They were -- back in 2016 I was just first producing draft**  
2 **simulations.**  
3 Q. But why?  
4 MR. YEAGER: Can I just comment?  
5 MR. CARVIN: Yes.  
6 MR. YEAGER: We had engaged him. He was doing  
7 preliminary work that led to this case.  
8 MR. CARVIN: That's what I'm trying to figure out.  
9 BY MR. CARVIN:  
10 Q. When you say a large number, for example, how many -- in the  
11 rough neighborhood how many House maps did you produce?  
12 **A. Definitely over ten.**  
13 Q. Okay.  
14 **A. I don't recall, and certainly didn't keep record of --**  
15 Q. Were those ten produced pursuant to the same algorithm that  
16 you later used for the one thousand?  
17 **A. No. An earlier draft.**  
18 Q. Okay. An earlier draft of the algorithm?  
19 **A. To my recollection, when I started out I went through**  
20 **multiple drafts, and went through structural changes. And so**  
21 **certainly I had produced, using earlier drafts of my**  
22 **simulation algorithm, a number of House and Senate plans.**  
23 Q. When you use the word draft, do you mean draft simulation  
24 algorithms or draft actual maps?  
25 **A. Both.**

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1 Q. Okay.  
2 **A. In other words, the simulation code, in the draft form,**  
3 **produced maps in draft form.**  
4 Q. But you subsequently made changes to the simulation algorithm  
5 which produced different maps. Do I understand that  
6 correctly?  
7 **A. Correct.**  
8 Q. Okay. And at the end of that process you had roughly, say,  
9 ten maps for the House?  
10 **A. I don't want to say it was roughly ten, I definitely recall**  
11 **at least ten. I just didn't keep a record, and it was such a**  
12 **long time ago.**  
13 Q. Okay. To your knowledge, were those maps attached to the  
14 Plaintiffs' complaint?  
15 **A. I have no idea.**  
16 Q. Okay.  
17 **A. Wait, let me think about that. I want to think about whether**  
18 **I know the answer to that.**  
19 **Your question was to my knowledge, were they**  
20 **attached to the Plaintiffs' complaint?**  
21 Q. Right. I don't want to wordsmith here.  
22 Do you know if the maps that were attached to the  
23 Plaintiffs' complaint were among the maps that you had  
24 produced in 2016?  
25 **A. I don't know.**

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1 Q. Okay. Do you know if they came from the one thousand  
2 simulated maps that you produced pursuant to your algorithm?  
3 **A. I don't know.**  
4 Q. Okay. What if anything do you know about the maps that were  
5 attached to the Plaintiffs' complaint?  
6 THE WITNESS: What are my instructions?  
7 MR. YEAGER: You're asking about the maps that were  
8 attached to the complaint?  
9 MR. CARVIN: Yes.  
10 MR. YEAGER: I believe the witness can answer this  
11 question without invading work product or Rule 26 protection.  
12 So my instruction to you is to answer the question.  
13 If you believe your answer is going to require you  
14 to disclose communications with counsel, other than just  
15 providing maps, then don't answer that and we can discuss  
16 what you may need.  
17 Within that constraint, you may answer.  
18 THE WITNESS: Okay. I'm going to do my best to  
19 answer your question while following Mr. Yeager's instruction  
20 to me, which puts some limits on how I can answer here.  
21 So to my knowledge, I produced a significant number  
22 of maps, definitely over five or ten. And to my knowledge,  
23 some of those were attached to Plaintiffs' complaint.  
24 BY MR. CARVIN:  
25 Q. Okay.

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1 **A. That's the best of my knowledge.**  
2 Q. And just to be clear, the maps you just referred to, were  
3 those among the thousand simulated maps or did they precede  
4 the production of those?  
5 **A. You're asking about the maps attached to Plaintiffs'**  
6 **complaint.**  
7 Q. Yes.  
8 **A. I don't know.**  
9 Q. Okay. Do you know whether the five to ten or whatever it was  
10 were among the thousand?  
11 MR. YEAGER: Objection, vague, ambiguous.  
12 You may answer.  
13 THE WITNESS: I think by five and ten, you're  
14 referring to the draft maps that I was talking about from  
15 back in 2016.  
16 BY MR. CARVIN:  
17 Q. The ones you just referenced in your answer.  
18 **A. Yeah, I think I know what you're talking about, you're**  
19 **talking about early drafts. And that's why I described them**  
20 **as early drafts.**  
21 **I certainly went through drafts of the algorithm**  
22 **and then made more changes and started all over again, and**  
23 **ultimately produced one thousand. So I'm talking about two**  
24 **different sets, separate maps.**  
25 Q. I know you did. But you also said there was a smaller subset

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1 that you had produced as well. Right?  
2 You used the phrase five to ten a minute ago.  
3 **A. I was talking about the same thing. I mean the point is that**  
4 **I produced draft maps, draft simulation algorithms years ago,**  
5 **produced some maps; and then later on, produced one thousand**  
6 **for the purpose of the three sets in my report.**  
7 Q. Just to clarify for the record, I'm now talking about, say,  
8 the Congressional map that was attached to the complaint, was  
9 that among the draft maps that you had prepared?  
10 **A. Okay. I gotcha. I apologize for misunderstanding the**  
11 **question.**  
12 **And the answer is that I don't know.**  
13 Q. You've never reviewed the maps that were attached to the  
14 complaint?  
15 THE WITNESS: What are my instructions?  
16 MR. YEAGER: You can answer that.  
17 THE WITNESS: I can answer that even by making  
18 reference to communications with Plaintiffs' counsel? What  
19 are my instructions?  
20 MR. YEAGER: Okay. Now the witness has expressed a  
21 concern about that communication so we're going to have to  
22 take a break so I can figure out what it is and figure out if  
23 he can answer the question that's on the table.  
24 (At 10:55 a.m. went off the record.)  
25 (At 11:00 a.m. went on the record.)

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1 MR. CARVIN: Back on the record.  
2 BY MR. CARVIN:  
3 Q. What if anything do you know about where the alternative maps  
4 attached to Plaintiffs' complaint came from?  
5 **A. My understanding is that they came from maps that I produced.**  
6 Q. And do you know whether the maps you produced were among the  
7 thousand simulated maps, or were they perhaps different, as  
8 far as you know?  
9 **A. You're talking about the maps -- about the complaint maps?**  
10 Q. Yes.  
11 **A. I don't know. I don't know for sure the answer to that.**  
12 Q. Okay. Fair enough.  
13 Did you read Professor Mayer's report?  
14 **A. No, sir.**  
15 Q. Okay. Do you know that he referenced demonstration plans?  
16 **A. I have been overhearing conversations between you and Mr.**  
17 **Yeager this morning, and I gathered that was the case.**  
18 Q. So do you know whether or not the demonstration plans are  
19 different from the maps attached to the Plaintiffs'  
20 complaint?  
21 **A. To my knowledge, I have not -- well, I have not seen**  
22 **Professor Mayer's report, so that's not something I can say**  
23 **for sure. I've just not seen his report.**  
24 Q. Fair enough. So you don't know if any similarity or lack of  
25 similarity between the demonstration plans are analyzed in

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1 Is that a fair assumption?  
2 **A. That is correct. I'm just saying I didn't transmit to him**  
3 **any maps.**  
4 MR. CARVIN: Counsel, we did have a discussion  
5 earlier. Can you make any representation about where the  
6 demonstration plans came from, and whether they're different  
7 from the Plaintiffs' alternative map?  
8 We are going to make quite an issue of this, if --  
9 but you can clarify the situation if you want.  
10 MR. YEAGER: Well I'm not going to do it on the  
11 record in this deposition. I'll be glad to do it in some  
12 other appropriate format.  
13 I know there is some outstanding discovery about  
14 this. I'm having e-mails right now with your co-counsel  
15 regarding files for the maps that we've produced. And you  
16 and I did have that conversation.  
17 If there is something, a particular fact that you  
18 want stipulated, I'll consider that.  
19 MR. CARVIN: Okay. Yes. What we'd like you to  
20 stipulate to is that the demonstration maps were either  
21 provided by you and/or are different from -- the same as or  
22 different from the alternative maps.  
23 What I'm trying to figure out is are the  
24 alternative maps attached to the complaint different than the  
25 demonstration plans in Mayer's report.

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1 Professor Mayer's reports and the maps produced, attached to  
2 the complaint?  
3 **A. I have not reviewed the maps that Professor Mayer apparently**  
4 **reviewed in his report. I haven't seen the report. So I**  
5 **don't know what maps those are. I wouldn't have any basis**  
6 **for being able to answer that.**  
7 Q. For the same reason, I take it, you don't know the genesis of  
8 the plans in the Mayer report?  
9 **A. Not being able to identify those maps, I can't say for sure.**  
10 Q. Okay. Are you aware of any transmittal of maps to Professor  
11 Mayer?  
12 **A. Am I aware of any transmission of maps?**  
13 Q. Yes.  
14 MR. YEAGER: To Professor Mayer?  
15 MR. CARVIN: Correct.  
16 THE WITNESS: From me or from Plaintiffs' counsel?  
17 BY MR. CARVIN:  
18 Q. Just anybody.  
19 **A. I can speak for myself. I have never transmitted any maps to**  
20 **Professor Mayer by myself.**  
21 Q. I really think this is just a clean-up question. You've  
22 testified that you haven't seen the demonstration plans, you  
23 haven't read the Mayer report. I'm going to assume from that  
24 that you don't know who gave him the plans or anything about  
25 the plans.

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1 MR. YEAGER: As I've told you, those two sets are  
2 not identical. They may not be -- there may be some overlap.  
3 MR. CARVIN: Okay.  
4 MR. YEAGER: I'm just not aware as I sit here  
5 because I haven't gone back and reviewed them since you  
6 raised that issue this morning. Again that's all in the  
7 materials that have been provided.  
8 But that's the answer to the question.  
9 MR. CARVIN: And that's fair. And I'm assuming  
10 from Professor Chen's answer that since he wasn't the source  
11 of the provision to Mayer, and Mayer didn't produce the maps,  
12 without revealing any confidences, those were provided by  
13 Plaintiffs' counsel to him.  
14 Is that fair?  
15 MR. YEAGER: I'm sorry, I'm distracted.  
16 Would you read that back?  
17 (Record read: Q. And I'm assuming from Professor  
18 Chen's answer that since he wasn't the source of the  
19 provision to Mayer, and Mayer didn't produce the maps,  
20 without revealing any confidences, those were provided  
21 by Plaintiffs' counsel to him.  
22 Is that fair?)  
23 MR. YEAGER: The maps that Professor Mayer attached  
24 to his report were provided by Plaintiffs' counsel.  
25 MR. CARVIN: Okay. Thank you.

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1 BY MR. CARVIN:  
2 Q. All right. Hopefully we're not going to get into another  
3 sticky discovery issue, but let me wade in here as well.  
4 Have you provided Defendants with the source code  
5 from which -- well the source code for the use for the  
6 thousand simulated maps?  
7 **A. The simulated maps in my report is what you're referring to?**  
8 Q. Yes.  
9 **A. And I have provided to Mr. Yeager, or to Plaintiffs' counsel,**  
10 **a draft code that is substantially the same as the code that**  
11 **I ultimately used --**  
12 Q. Okay.  
13 **A. -- to produce.**  
14 **So it is structurally identical to the ultimately**  
15 **compiled code that I used to produce the three different sets**  
16 **of simulations in my report.**  
17 Q. Where is the code that you ultimately used?  
18 **A. The code that I ultimately used was a .JAR, it's a compiled**  
19 **.JAR file. That's how I ultimately run simulations.**  
20 Q. Where is that .JAR file?  
21 MR. YEAGER: That was produced.  
22 THE WITNESS: And well I'll just explain that I  
23 believe back in June Mr. Yeager asked me to produce that .JAR  
24 file. And I went back and identified I believe it was three  
25 different .JAR files, I can't remember if it was three sets

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1 of code that were compiled into one .JAR file, but I gave  
2 those to Mr. Yeager.  
3 BY MR. CARVIN:  
4 Q. Right. But in addition to that you provided a source code  
5 that you say is substantially the same as your final source  
6 code, correct?  
7 **A. A draft code, a draft source code of the three sets of**  
8 **simulations.**  
9 Q. Okay.  
10 **A. That is substantially the same.**  
11 Q. All right. Where is the final draft code?  
12 MR. YEAGER: Objection, vague and ambiguous.  
13 BY MR. CARVIN:  
14 Q. Are you really confused by this?  
15 MR. YEAGER: When you say final draft code --  
16 BY MR. CARVIN:  
17 Q. You said you provided a draft code that was substantially the  
18 same as the final?  
19 **A. Yes.**  
20 Q. Okay. Where is the final?  
21 **A. That basically is the final draft code. It is structurally**  
22 **the same as what I actually ran.**  
23 Q. Okay. And you have that, and you were able to provide that  
24 to us, correct, the one that's substantially the same?  
25 **A. Yes, sir.**

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1 Q. Okay. We want the one that is not substantially the same,  
2 but is the one that was actually used. Can you provide that  
3 to us?  
4 **A. I save draft code as I make changes to it. And I went back**  
5 **and looked, and that, to the best of my recollection, and as**  
6 **far as I can tell, is essentially identical. It is identical**  
7 **in structure to the simulations that I ran.**  
8 Q. All right. But why do you have to give us one that's  
9 substantially the same. Why not give us the one that  
10 produced the simulations? Is it not available?  
11 **A. I don't save every single change that I make.**  
12 Q. Okay.  
13 **A. I save changes from time to time.**  
14 Q. Did you not save these?  
15 **A. I did. I made -- I saved it in its -- in its form before I**  
16 **ran the simulations, in the same structural form before I ran**  
17 **the simulations.**  
18 Q. Right. But then you ran the simulations; can you give us the  
19 source code for the actual simulations that were run? Did  
20 you save them?  
21 MR. YEAGER: Asked and answered.  
22 You may answer.  
23 THE WITNESS: As I said, I turned over, number one,  
24 the actual compiled code.  
25 BY MR. CARVIN:

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1 Q. Right.  
2 **A. That I identified.**  
3 Q. Right.  
4 **A. And then I turned over the uncompiled draft code in the,**  
5 **substantially the same form as I identified it.**  
6 Q. Right.  
7 **A. Before producing that compiled -- that compiled JAR file.**  
8 Q. Right. And can you give us the one that's not in  
9 substantially the same form, but the one that was actually  
10 used?  
11 **A. I did.**  
12 Q. No. All right.  
13 You didn't produce the source code that actually  
14 relates to the actual simulations, right? You produced one  
15 that you say is substantially the same and functionally  
16 identical.  
17 MR. YEAGER: Objection, misstates the testimony.  
18 You may answer.  
19 THE WITNESS: I didn't hear the question.  
20 BY MR. CARVIN:  
21 Q. Why don't you tell me what you gave to us in your own words  
22 that was substantially the same.  
23 **A. Oh, you're asking what that is?**  
24 Q. I'm asking you why you have to give us something that's  
25 substantially the same as opposed to the actual.



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1 A. Because that's the only draft code that I've got.  
2 Q. And that's why I'm asking. Did you delete it?  
3 A. No.  
4 Q. Did you not save it?  
5 A. I just did not save every single iteration or every single  
6 word that was changed in the code. I only save code when  
7 there is a structural or substantial change made.  
8 So I don't change -- I don't save a draft copy of  
9 the code after every single function that's added or every  
10 single command that's added.  
11 Q. And --  
12 A. I think I understand your question, the answer is it just  
13 doesn't exist. It never existed.  
14 Q. Because you didn't -- well it existed to run the simulations.  
15 A. I never saved it is what I'm saying --  
16 Q. Right.  
17 A. -- when I say it never existed.  
18 Q. And you're saying that it's not automatically saved?  
19 A. No. It's not like Microsoft Word where there is something  
20 like an autosave function that automatically saves every 30  
21 seconds or something like that.  
22 Q. Or using Java code?  
23 A. Oh, I write code in Java.  
24 Q. And doesn't that automatically save?  
25 A. Like I said, no. There is no autosave.

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1 Q. Is that your testimony?  
2 A. Well, okay. I'll say this is my testimony to the best of my  
3 knowledge.  
4 There may well be some kind of Java compiler out  
5 there that does in fact have an autosave function by default.  
6 I'm not specifically aware of it and certainly I haven't used  
7 any such thing before.  
8 But in my practice, the way that I write Java code  
9 for my research, I don't use any sort of software or any sort  
10 of compiler that has an autosave function.  
11 Q. All right. You say they were substantially the same. How  
12 did they differ?  
13 A. Sure. I went back and looked at the various drafts of my  
14 Java code that I had actually saved and I identified this one  
15 draft as being substantially the same. But I could see that  
16 there were cosmetic changes, there were cosmetic differences  
17 that I would -- that, to the best of my recollection, I  
18 certainly would have taken out, simply because they're not  
19 part of the essential structure of the simulation.  
20 So these are cosmetic things that I certainly would  
21 not have wanted to really be running in part of the final  
22 code because they're cosmetic.  
23 Q. Okay. Can you describe that, what you took out?  
24 A. Yeah. I'll do so to the best of my recollection. But like I  
25 said they're all cosmetic changes.

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1 So I'll give an example. When you run Java code,  
2 you have a console that can display output. It's just, say,  
3 numbers or text that pops up on the screen. And it tells you  
4 about the progress, or the status of various variables or  
5 various functions, or various classes that are going on in  
6 the code.  
7 So it's just kind of like a status update. To put  
8 it in the form of analogy, it's like if you download a huge  
9 file from the internet, you might have a window that pops up  
10 that says it is 98 percent finished or 58 percent finished,  
11 like status update. Those are things that have no meaning,  
12 other than displaying the status of a process on the console  
13 for the screen to display.  
14 Now obviously that doesn't affect the structure of  
15 any of the simulations.  
16 So that's -- some of those are redundancy checks,  
17 some of those are just for the sake of being able to check  
18 for the proper running, to check to see how fast the  
19 processes are running. But they have no essential structure  
20 in the simulation algorithm.  
21 And so, for the purposes of producing a large  
22 number of simulations, you don't want -- I'm going to speak  
23 for myself, I certainly don't want those taking up processing  
24 power, taking up RAM.  
25 So those are things that are cosmetic, just are not

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1 helpful, and are just going to slow things down. So that's  
2 the sort of cosmetic thing that I'm talking about.  
3 I could give you some more examples if you'd like  
4 to but I'm just trying to explain what I mean when I say  
5 cosmetic.  
6 Q. Did you add or subtract any functions?  
7 A. I subtracted those cosmetic things.  
8 Q. And what does cosmetic mean in this context?  
9 A. Okay, sure --  
10 MR. YEAGER: Asked and answered.  
11 You may answer.  
12 THE WITNESS: I think I was just trying to answer  
13 that with your previous question. I'll try again, so I  
14 apologize if I'm repeating myself here.  
15 What I mean by cosmetic changes is changes that are  
16 removing things that are not essential to the structure or  
17 functioning of the algorithm.  
18 So an example is like I was saying a minute ago,  
19 when you have to run Java code, there is a console, and that  
20 console can display text or numbers. And so there are  
21 various lines of codes that will, say, display the value of a  
22 particular variable, display the progress for a particular  
23 class that's running, display something that's going on.  
24 Those aren't actually helping to create a simulated  
25 plan, those are just kind of like status updates.



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1 The example I gave you a second ago is you download  
2 a file of the internet, a window pops up and says 58 percent  
3 of the file has downloaded, downloading still in progress.  
4 That's just kind of an analogy.  
5 BY MR. CARVIN:  
6 Q. Right.  
7 **A. But these are cosmetics things. That windows that pops up**  
8 **that tells you 58 percent of the file is downloading, that's**  
9 **not actually -- that's not actually part of the structure of**  
10 **downloading the file. It's just updating the console,**  
11 **updating the window telling you that it has made a certain**  
12 **amount of progress.**  
13 **That's what I mean by cosmetic.**  
14 Q. Right. And the version you provided to us will have those  
15 cosmetic functions in it?  
16 **A. To my knowledge, I looked in that draft code, and I saw -- I**  
17 **saw some number -- a substantial number of those kind of**  
18 **cosmetics things.**  
19 Q. And your testimony is the only difference between what you've  
20 provided to us and what went into producing the actual  
21 simulated plans, is those cosmetic functions?  
22 **A. Yes. I saw lots of these cosmetic things that I definitely**  
23 **would have taken out. And to the best of my knowledge, those**  
24 **were the changes.**  
25 Q. But you can't provide us when you made those changes because

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1 you chose not to save them?  
2 **A. It's just not my normal practice to save after only purely**  
3 **cosmetic changes. Let me just state that more clearly. I**  
4 **don't think all the words got out there.**  
5 **It is not my normal practice to save drafts of my**  
6 **Java code after every single cosmetic change that makes no**  
7 **substantial or structural change.**  
8 Q. Right.  
9 **A. I only save -- I generally save drafts of my Java code, to my**  
10 **recollection, when I made structural, substantial changes.**  
11 Q. And it's your testimony that Java does not save these drafts  
12 automatically as far as you understand?  
13 MR. YEAGER: Asked and answered.  
14 You may answer.  
15 THE WITNESS: Same answer as before. Obviously I'm  
16 not going to testify that I know about all the different Java  
17 compilers that there out in the world and what different Java  
18 programmers might use or not use.  
19 I'm just telling you from my own personal  
20 experience and my own personal practice, I do not employ and  
21 have never used a Java compiler that has that sort of  
22 autosave function that you're describing.  
23 If it's there, I don't know how to use it. I've  
24 never made it a practice to do so. But to my knowledge, I  
25 don't know how to.

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1 I'm just saying that I don't know how to activate  
2 an autosave.  
3 BY MR. CARVIN:  
4 Q. What did you use?  
5 **A. I'm sorry?**  
6 Q. Java code, what did you use to run these simulations?  
7 **A. I used Java code.**  
8 Q. And your version of Java code doesn't automatically save  
9 different iterations?  
10 MR. YEAGER: Asked and answered.  
11 You may answer.  
12 THE WITNESS: I think what I said a minute ago was  
13 I don't have a Java compiler or anything on my computer that,  
14 to my knowledge, autosaves Java code.  
15 BY MR. CARVIN:  
16 Q. Okay. In the litigation in North Carolina, did you produce  
17 your final source code, in the litigation, do you know?  
18 **A. My recollection is that I produced .JAR compiled Java code**  
19 **file.**  
20 Q. Right. But the uncompiled source code?  
21 **A. In the North Carolina case?**  
22 Q. Yes.  
23 **A. No.**  
24 Q. Okay.  
25 **A. My recollection is no.**

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1 Q. How about in Pennsylvania?  
2 **A. My recollection is no.**  
3 Q. Okay. In any case have you ever produced your final source  
4 code?  
5 **A. You're talking again about the uncompiled source code?**  
6 Q. Yes.  
7 **A. And my recollection is, no, except that sometime last month**  
8 **Mr. Yeager asked me to look through and identify draft,**  
9 **uncompiled source Java code.**  
10 Q. Has anyone beside you ever seen the final source code for any  
11 of these analysis that you produced in any of these  
12 litigations?  
13 **A. To my knowledge, yes.**  
14 Q. Who?  
15 **A. I'm going to do my best to answer the question, but obviously**  
16 **I'm going to qualify that I couldn't possibly know an**  
17 **exhaustive list.**  
18 **So certainly I know -- I recall that there have**  
19 **been -- I recall that there was an expert hired by the**  
20 **Defendants in the North Carolina Rucho case that testified**  
21 **that he reviewed my Java code, the .JAR file that I turned**  
22 **over.**  
23 **Now that was his testimony. Obviously I'm saying**  
24 **I'm just taking his word for it. I don't know whether he**  
25 **actually did or not. But to my knowledge he testified that**

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1 he did.  
2 Q. How did he obtain it?  
3 A. I'm sorry?  
4 Q. How did he obtain it, in North Carolina?  
5 A. How did he obtain that .JAR file?  
6 Q. Oh, now you're back to the .JAR file, right?  
7 A. Yes.  
8 Q. Okay. The compiled?  
9 A. Yes.  
10 Q. But nobody has ever seen the uncompiled final source code,  
11 right?  
12 A. Okay. In -- let me just go back and explain what I was  
13 saying about the North Carolina case.  
14 As I said, I turned over a .JAR file in the North  
15 Carolina case. And the expert that I was just referring to,  
16 to my knowledge, he testified that he had reviewed that, and  
17 testified to some things about it, gave his opinion about it.  
18 I do not recall -- to my knowledge, I did not turn  
19 over uncompiled code because I wasn't asked to.  
20 Q. Okay. So again as far as you know, nobody, except you, in  
21 any of these litigations on the opposite side of the  
22 litigation has ever seen your uncompiled final source code,  
23 right?  
24 A. Not to my knowledge.  
25 Q. Okay. Did you have any health issues between June 1st and

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1 which prevented you from rapidly responding to discovery  
2 requests or providing the kind of code that we've been  
3 discussing between, say, June 1st and mid August?)  
4 MR. YEAGER: I think the witness wants to consult  
5 with me on answering that question. Is that okay with you?  
6 MR. CARVIN: Yeah, but we've got a lot of --  
7 MR. YEAGER: We'll make it quick. We'll step out  
8 very quickly.  
9 (At 11:23 a.m. went off the record.)  
10 (At 11:28 a.m. went on the record.)  
11 MR. YEAGER: Can you read back the question please?  
12 (Record read: Q. Was there any health issues  
13 which prevented you from rapidly responding to discovery  
14 requests or providing the kind of code that we've been  
15 discussing between, say, June 1st and mid August?)  
16 THE WITNESS: The answer is yes.  
17 BY MR. CARVIN:  
18 Q. And can you give me a rough time estimate, how long were you  
19 disabled or disadvantaged?  
20 MR. YEAGER: Well that's going to ask him to reveal  
21 another bit of health information.  
22 MR. CARVIN: I don't need it.  
23 MR. YEAGER: You don't need it? Okay.  
24 MR. CARVIN: I got to get through this.  
25 MR. YEAGER: Okay.

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1 mid August of this year?  
2 A. Yes.  
3 Q. What was that?  
4 MR. YEAGER: I'm going to object.  
5 BY MR. CARVIN:  
6 Q. I'm going to give you some relevance because obviously this  
7 is an atypical question, and I don't want to get involved in  
8 your personal privacy.  
9 Was there any health issues which prevented you  
10 from rapidly responding to discovery requests or providing  
11 the kind of code that we've been discussing between, say,  
12 June 1st and mid August?  
13 MR. YEAGER: I'm going to let him answer that  
14 question, but just to protect his private health information,  
15 I'll just ask you to answer yes or no and then we'll go on if  
16 counsel would like to go on.  
17 BY MR. CARVIN:  
18 Q. Just to reinforce Mr. Yeager's point, I'm not at all  
19 interested in your health issues and I understand the privacy  
20 concerns.  
21 I'm wondering if this was a factor in any potential  
22 delays in responding to our discovery requests?  
23 MR. YEAGER: Could you just read back the question  
24 that's on the table?  
25 (Record read: Q. Was there any health issues

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1 BY MR. CARVIN:  
2 Q. My last -- what compiler do you use?  
3 A. What Java compiler do I use?  
4 Q. Yes.  
5 A. I use a number of different -- I have used a number of  
6 different compilers. I most commonly use, it's just a piece  
7 of software called Eclipse, E-C-L-I-P-S-E.  
8 There are others that I've used from time to time.  
9 I can't recall names off the top of my head, but there are  
10 others.  
11 Q. Which one did you use here?  
12 A. Which compiler did I use for the purpose of the -- for the  
13 simulations here in my report?  
14 Q. Yes.  
15 A. Again, I used a number, and Eclipse is certainly one that I  
16 used. I recall that I have certainly used another one  
17 that -- I'm trying to think of the name, but I just can't get  
18 it off the top of my head.  
19 But I have tried using multiple compilers, and  
20 Eclipse is the one I most commonly use.  
21 Q. Do you recall which one you used here?  
22 A. Multiple.  
23 Q. So it wasn't just Eclipse?  
24 A. I don't want to say that it was definitely only just Eclipse.  
25 I definitely recall at times using other compilers, with

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1 Eclipse being the most common one.  
2 I recall having definitely used another compiler  
3 called -- I believe it's called Netbeans.  
4 Q. Can you spell that, please?  
5 A. I think it's N-E-T-B-E-A-N-S. That's all I can recall off  
6 the top of my head right now.  
7 Q. All right. If you could turn to page three of your report,  
8 please.  
9 A. (Witness complied.)  
10 Q. And you provide a summary of the statutory criteria, that you  
11 say the statutes described five criteria to be followed in  
12 producing each districting plan, correct?  
13 A. I see that, yes, sir.  
14 Q. And then you list the five criteria, correct?  
15 A. Yes, sir.  
16 Q. Okay. Then you state, both statutes state that the list of  
17 districting guidelines detailed in each statute is  
18 exhaustive.  
19 Is that right?  
20 A. I see that.  
21 Q. Then you say, hence it is clear that both statutes not only  
22 specify the five districting criteria in their order of  
23 priority, but they also prohibit any other considerations.  
24 Is that correct?  
25 A. I see that.

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1 Q. Okay. So it's your understanding of the statute that they  
2 not only specify the five districting criteria, but they  
3 prohibit consideration of other considerations, correct?  
4 A. Yes. And I'm just going to qualify that obviously, as I  
5 relatedly explained earlier today, when I use the word  
6 prohibit there I'm talking about prohibit for the purposes of  
7 my applying the criteria to my own simulations. I'm  
8 obviously not giving you a legal opinion.  
9 Q. Nor are you commenting on what other map drawers might have  
10 understood were the criteria guiding the redistricting in  
11 Michigan, is that correct?  
12 A. To my knowledge, I don't know of -- well, I just don't know  
13 of what other map drawers may have been, or not been using.  
14 So that's -- I think that's a correct statement because I  
15 just have no personal knowledge of other map drawers.  
16 Q. So when you use the words, the statute prohibits any other  
17 considerations, you were not suggesting that the statute  
18 prohibits line drawers in Michigan from considerations in  
19 addition to the five listed statutory criteria, is that  
20 correct? You're just saying what you did.  
21 A. I'm talking about how I applied the criteria. I'm obviously  
22 not talking about a legal opinion regarding what other map  
23 drawers should or should not do.  
24 Q. Right. You're not offering either a legal or layman's  
25 opinion about what the statutory criteria require

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1 redistricters to do in Michigan, correct?  
2 A. I'm not sure how a layman's opinion would be different than a  
3 legal opinion. But the point is I'm not offering any legal  
4 expertise about how this statute would apply to other map  
5 drawers, aside from explaining how I imposed these  
6 prohibitions and these criteria on my own computer code.  
7 Q. So in your understanding of the statutory criteria, did the  
8 statutes prohibit consideration of incumbency protection,  
9 preserving the cores of existing districts, preserving  
10 communities of interest?  
11 A. Again, same qualification as before, not a legal opinion.  
12 And my reading of the statute tells me that there  
13 are criteria to be used, and that I interpreted those  
14 criteria, and the statute, as telling my simulation algorithm  
15 to not use any other criteria not mentioned, such as  
16 incumbency protection.  
17 MR. YEAGER: I apologize, just let me turn this off.  
18 Go ahead.  
19 BY MR. CARVIN:  
20 Q. You described what you used to come up with your simulations.  
21 My question is somewhat broader.  
22 Do you have an understanding of the statutes that  
23 would prohibit as impermissible in Michigan consideration of  
24 non-listed criteria such as protecting incumbents, preserving  
25 the cores of existing districts, and preserving communities

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1 of interest?  
2 A. As impermissible in Michigan, is what your question asked?  
3 And I interpret that as asking whether I have a legal  
4 opinion, and I don't.  
5 Q. What I'm asking you -- I don't want you to qualify it as a  
6 legal opinion.  
7 When you're interpreting the statute, do you have  
8 any interpretation of the statute which would prohibit  
9 consideration of incumbency protection, cores or communities  
10 of interest?  
11 MR. YEAGER: Asked and answered.  
12 You may answer.  
13 THE WITNESS: Like I said, it's just not part of my  
14 expert opinion to say what the statute means for Michigan  
15 drawing maps.  
16 BY MR. CARVIN:  
17 Q. Okay.  
18 A. I can only tell you what it meant for the purpose of my  
19 operationalizing these in simulated plans.  
20 Q. Are you aware that incumbency protection, preserving the  
21 cores of existing districts, often play a role in  
22 redistricting generically?  
23 A. I'm generally aware that those have been cited and  
24 sometimes -- cited or alleged as considerations in other  
25 states. I'm very generally aware of that. I'm not saying

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1 anything about the legality of it. Obviously I'm not saying  
2 anything about whether that is permissible.  
3 But I'm generally aware those are cited or alleged.  
4 Q. And how about is preserving communities of interest a  
5 traditional districting --  
6 A. Actually, I want to just make sure that I heard your previous  
7 question correctly. And I apologize for going back, but  
8 could I hear the previous question again and make sure that I  
9 answered the question that I thought I was answering?  
10 (Record read: Q. Are you aware that incumbency  
11 protection, preserving the cores of existing districts,  
12 often play a role in redistricting generically?  
13 A. I'm generally aware that those have been cited  
14 and sometimes -- cited or alleged as considerations in  
15 other states. I'm very generally aware of that. I'm  
16 not saying anything about the legality of it. Obviously  
17 I'm not saying anything about whether that is  
18 permissible.  
19 But I'm generally aware those are cited or  
20 alleged.  
21 Q. And how about is preserving communities of  
22 interest a traditional districting --)  
23 THE WITNESS: Thank you.  
24 I just want to go back to the previous question.  
25 And I want to qualify that the answer I gave to the previous

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1 they use the word traditional districting principles to only  
2 reference criteria that are specifically specified in the  
3 constitution or state statute, is that your testimony?  
4 A. That's not quite what I said.  
5 What I said was traditional districting criteria is  
6 usually what I would refer to as a political scientist as a  
7 principle that is commonly or often enshrined in state  
8 constitutions or in state statutory guidelines regarding  
9 criteria to be followed in redistricting.  
10 An example is compactness. That's one that you  
11 very commonly find as being one that's required or a  
12 guideline for redistricting in many different states,  
13 possibly most states.  
14 So that's all. I just wanted to clarify that. I  
15 don't think what you recounted was quite what I said.  
16 Q. I'll ask it again. Is it your understanding that traditional  
17 districting principles only encompass criteria that are  
18 specifically referenced in constitutional or statutes in the  
19 particular state?  
20 MR. YEAGER: Asked and answered.  
21 You may answer.  
22 THE WITNESS: Right, and my answer again is, no,  
23 that was not my understanding.  
24 BY MR. CARVIN:  
25 Q. Okay. So it could include things that are not referenced in

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1 questions only applies to the protection of incumbents,  
2 which -- that was what I was giving my answer to.  
3 With respect to, I think you described it as  
4 preservation of the cores, I'm not sure that I'm able to give  
5 the same answer to that one.  
6 BY MR. CARVIN:  
7 Q. Let's break it up.  
8 Is preserving the cores of existing districts in  
9 your opinion as a political scientist a traditional  
10 districting principle?  
11 A. No, sir.  
12 Q. Why not?  
13 A. Usually what we mean by traditional districting criteria, as  
14 a political scientist, is criteria that are commonly  
15 enshrined in various state's constitutional or statutory  
16 provisions laying out principles to be followed or criteria  
17 to be followed in districting.  
18 Q. It's -- I'm sorry.  
19 A. I was just going to add to that by saying that, so it is not  
20 the case that, for example -- it is not the case that most  
21 states have constitutional or statutory provisions requiring  
22 the, some kind of idea of preservation of cores.  
23 So that's why we wouldn't call it a traditional  
24 districting principle as a political scientist.  
25 Q. So it's your understanding in the political science community

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1 constitutions and statutes, correct?  
2 A. That's not -- that's also not what I said. But I'll take  
3 that question by itself.  
4 And I think your question was, could traditional  
5 districting criteria include things that are not referenced  
6 at all in state statutes or in constitutions.  
7 Certainly it's possible that if there is one state  
8 that does not reference compactness, that certainly doesn't  
9 mean that compactness is not a traditional districting  
10 criteria.  
11 But if, say, in a hypothetical world there were no  
12 state constitution, no state statute, no legislative  
13 statements regarding redistricting criteria that ever  
14 mentioned compactness, then it would be awfully hard to claim  
15 that compactness is a traditional redistricting criteria.  
16 That's obviously a counterfactual hypothetical.  
17 But that's the basis of my answer.  
18 Q. But we agree that traditional districting principles can  
19 include factors that are not mentioned in the constitution or  
20 statutes, correct?  
21 A. I think that's the question you asked a moment ago, so I'm  
22 just going to give the same answer.  
23 It certainly is possible that if there is a  
24 criteria that is not mentioned in one state's constitution,  
25 that fact by itself does not automatically mean that the

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1 criterion is not a traditional districting criterion.  
2 Q. That's not my question.  
3 The question, for the fourth time is, do  
4 traditional districting principles include criteria that are  
5 not mentioned in the state's constitution or the state's  
6 statute?  
7 MR. YEAGER: Objection, asked and answered.  
8 You may answer.  
9 THE WITNESS: Okay. I'm going to answer the  
10 question that I think I heard, which is the same question  
11 that I think I've heard previously.  
12 Which is that it certainly is the case that if  
13 there is one state's constitution that does not include a  
14 specific criterion like compactness, that doesn't  
15 automatically mean that compactness is not a traditional  
16 districting criteria.  
17 BY MR. CARVIN:  
18 Q. Could it include -- I'll try it again. So it could include  
19 criteria that are mentioned in other state's constitutions  
20 and statutes, correct?  
21 A. Traditional districting criteria could include criteria that  
22 are included in other state's constitutions and statutory  
23 criteria.  
24 You said could, and I agree with that, that is  
25 possible.

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1 Q. Okay.  
2 A. Obviously I'm not saying it's automatically the case, but it  
3 is possible.  
4 Q. Do you have a view as to whether or not preserving the cores  
5 of existing districts has ever been mentioned in judicial  
6 opinions as a traditional districting principle?  
7 A. I'm not specifically aware of that right now.  
8 Q. If they have been referenced as traditional districting  
9 principles in judicial opinions, how would that affect your  
10 attitude about whether or not it's a traditional districting  
11 principle?  
12 A. I'm not sure that it would.  
13 Q. Meaning the fact that the judicial opinions reference it as a  
14 traditional districting principle would not suggest to you  
15 that preserving the cores of existing districts is a  
16 traditional districting principle?  
17 MR. YEAGER: Objection, incomplete hypothetical.  
18 You may answer.  
19 THE WITNESS: Yeah, I'm not sure that would affect  
20 my opinion.  
21 BY MR. CARVIN:  
22 Q. What do you mean you're not sure?  
23 A. I can't say for certain.  
24 Q. One way or the another?  
25 A. Correct.

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1 Q. So it might be a traditional districting principle if it's  
2 been mentioned in a traditional opinion in your  
3 understanding?  
4 A. As I said earlier, what I mean by the term traditional  
5 districting principle is whether it is enshrined in state  
6 constitutions and state statutes.  
7 Q. Okay.  
8 A. You're posing evidence that is outside of that.  
9 Q. Is it widely accepted in the political science community that  
10 traditional districting principles only include criteria that  
11 are -- or usually only include criteria that are mentioned in  
12 constitutions and statutes?  
13 A. Oh, I'm telling you how I use the term. I mean I can only  
14 speak about how I understand the term as a political  
15 scientist.  
16 Q. Right.  
17 A. I'm not going to testify for you that, say, all political  
18 scientists share the same view or that an X percentage of  
19 political scientists share the same view. I'm just here to  
20 testify about my own expert opinions.  
21 Q. Right. So you're not offering any view as to what the  
22 political science community would view as traditional  
23 districting principles, just your own personal views,  
24 correct?  
25 A. Like I said, I've not taken a survey or a poll of other

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1 political scientists, so I really can't give you any basis  
2 for saying X percent or 75 percent of political scientists  
3 share exactly my view or disagree with me.  
4 Q. Okay. How about communities of interest, is that a  
5 traditional districting principle?  
6 A. My understanding is that different jurisdictions have  
7 different -- when employing that phrase, have used different  
8 meanings of communities of interest.  
9 So there is not -- that means that we don't have  
10 the ability to issue a blanket statement by saying  
11 communities of interest definitely are or definitely are not  
12 a traditional districting criteria simply because different  
13 jurisdictions often mean different things by that.  
14 So I'm not able to give you a straight, absolute  
15 yes or no answer.  
16 Q. Okay. Can you turn to page 59 of your report, please?  
17 A. Yes, sir.  
18 Q. If you'd turn to the third full paragraph, please.  
19 A. Yes.  
20 Q. Just to put this in context, I'm reading from Appendix A  
21 where you describe the statutory guidelines and the  
22 computer-simulated districting algorithm that you did in this  
23 case, is that right?  
24 A. Third full paragraph, I see that.  
25 Q. Okay. Because, and you state there do you not, because of

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1 the clarity, specificity and exhaustiveness of the referenced  
2 statutes regarding the five districting criteria, as well as  
3 their order of priority, programming the districting  
4 simulation algorithm to produce Congressional, Senate and  
5 House plans for Michigan was a purely technical exercise with  
6 no subjective judgement or guesswork needed.  
7 Is that correct?  
8 **A. I see that.**  
9 Q. Okay. And that's what you did?  
10 **A. Yes, sir.**  
11 Q. It was a purely technical exercise, right?  
12 **A. Yes, sir.**  
13 Q. And so all one thousand simulations were the same goals with  
14 respect to contiguity, equal population, minimizing county  
15 and municipal breaks and compactness?  
16 **A. Oh, I employed those five criteria, yes, sir.**  
17 Q. Right. And in this technical way, the algorithm was  
18 instructing how these simulations were to come about. Right?  
19 **A. Well I don't know that they were instructing how the plans**  
20 **were to be drawn, they were instructing a specific process by**  
21 **which the plans were to be drawn.**  
22 Q. Okay. And the process was, for example, after contiguity and  
23 equal population, that they should seek to minimize the  
24 number of county and municipal breaks, right?  
25 **A. Correct.**

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1 Q. And if you could turn to page 15 of your report.  
2 **A. Yes, sir.**  
3 Q. Okay. So this is detailing the comparison of the enacted  
4 Congressional plans and your computer-simulated Congressional  
5 plans, is that right?  
6 **A. Yes, sir. And I'm just going to point out here, now that**  
7 **you've referenced this table, I believe that there was a**  
8 **corrected version --**  
9 Q. Okay.  
10 **A. -- of this table. And I'll bring it up again if you ask me**  
11 **about the parts of it that I recall were corrected.**  
12 Q. Okay.  
13 **A. I just wanted to raise that.**  
14 Q. So well it's more of an illustrative point. You have, for  
15 example, that in 22 simulated maps there was nine county  
16 breaks, and in 978 simulated maps, there was ten county  
17 breaks.  
18 That was not part of your errata, was it?  
19 **A. You're correct, sir.**  
20 Q. All right. Can you explain to me why that would come about  
21 if the criteria encouraged and required minimizing county  
22 breaks, why the vast majority of them would have an  
23 additional county break that was unnecessary?  
24 **A. I'm not sure what you mean by was unnecessary. If you could**  
25 **just clarify.**

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1 Q. We know that it is possible to create a congressional plan  
2 with only nine county breaks, right, because 22 simulated  
3 maps came up with that?  
4 **A. Okay.**  
5 Q. Right? And I'm just wondering why, if it's possible to do  
6 that, why the algorithm wouldn't have had all one thousand of  
7 the simulated maps do that?  
8 **A. Okay. So you're just generally asking why it is that the**  
9 **computer also produced these 978 congressional plans that did**  
10 **not reduce the number of county breaks to nine.**  
11 **Is that right?**  
12 Q. Yes.  
13 **A. Okay. Let me just start by pointing out that when -- I think**  
14 **you're reading the 978 from the second row, if I got that**  
15 **right.**  
16 Q. Yes.  
17 **A. Okay. And that second row is describing the number of**  
18 **counties divided into multiple districts.**  
19 Q. Okay.  
20 **A. So what the second row is telling us is that the enacted plan**  
21 **divided eleven counties into multiple districts in the**  
22 **enacted plan.**  
23 Q. Right.  
24 **A. And the number of divided counties in the simulated plans was**  
25 **either nine or ten.**

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1 **But your question, I think from a moment ago,**  
2 **unless I misheard you, was about county breaks.**  
3 Q. Let's eliminate the ambiguity. Let's go down to the next  
4 one, okay?  
5 Municipal breaks, now we're talking about municipal  
6 breaks, right? And 18 simulated maps found nine municipal  
7 breaks, and 982 had ten municipal breaks.  
8 And I'm wondering why under the algorithm the vast  
9 majority would come up with a municipal break that apparently  
10 was not -- was avoidable?  
11 **A. Okay. I will answer that question. But if you could,**  
12 **please, I just want to go back and finish my answer to your**  
13 **previous question.**  
14 Q. There is no reason to, we can move on.  
15 MR. YEAGER: Are you withdrawing the prior  
16 question?  
17 MR. CARVIN: Yes.  
18 MR. YEAGER: Let's go on then, he's withdrawing the  
19 prior question.  
20 THE WITNESS: Okay. So I think I understand your  
21 question. You're basically asking why it is that there are  
22 982 simulated maps that split -- or, sorry, that have ten  
23 municipal breaks, when certainly you're saying correctly,  
24 that it's possible, in the simulations, to produce only nine  
25 municipal breaks.

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<p style="text-align: right;">Page 82</p> <p>1 And the answer is that every simulation is a little</p> <p>2 bit different. The simulation is within the constraints that</p> <p>3 are, that I've described, is a random districting process,</p> <p>4 certainly within constraints, and within goals that are being</p> <p>5 pursued here.</p> <p>6 So the algorithm is trying to draw different</p> <p>7 districts with an eye towards minimizing county breaks, and</p> <p>8 minimizing municipal breaks, but it's not going to arrive at</p> <p>9 the exact same plan every single time. Otherwise we would</p> <p>10 just end up with one thousand completely identical plans.</p> <p>11 So there is randomness in the process. Which is</p> <p>12 why the plans are going to be a little bit different from one</p> <p>13 another, and that's why, when -- even when you pursue a</p> <p>14 specific goal like minimizing county breaks or minimizing</p> <p>15 municipal breaks, you're not always going to arrive at the</p> <p>16 exact same plan every single time because of the randomness</p> <p>17 inherent in the computer simulation process.</p> <p>18 And another way of putting it is that what the</p> <p>19 computer is doing is not dictating a certain set of lines to</p> <p>20 be drawn. It's not dictating the districts be drawn with</p> <p>21 particular boundaries, so much as it's saying draw random</p> <p>22 districts, but when you're drawing these random districts</p> <p>23 pursue certain criteria.</p> <p>24 So that's why there is some small amount of</p> <p>25 variation here in the number of municipal breaks that we see</p>	<p style="text-align: right;">Page 84</p> <p>1 A. Well I'm going to try my best to answer your question, and</p> <p>2 I'll just qualify it by saying that's a hypothetical. I</p> <p>3 haven't analyzed it, but I'm going to do my best shot of</p> <p>4 giving a guess.</p> <p>5 Certainly I can hypothetically think of, say, if</p> <p>6 you really wanted to place certain incumbents in certain</p> <p>7 districts or not pair certain incumbents, you could do that</p> <p>8 by manipulating district lines and, say, breaking an extra</p> <p>9 municipality or breaking a county -- breaking an extra</p> <p>10 county.</p> <p>11 I mean as a purely hypothetical matter, yes, one</p> <p>12 could pursue a certain placement of incumbents in a certain</p> <p>13 configuration and achieve that by breaking more counties or</p> <p>14 breaking more municipalities. Just as a purely hypothetical</p> <p>15 matter, that's possible.</p> <p>16 But obviously I'm not giving you an opinion as to</p> <p>17 whether in general this explains that, whether or not a</p> <p>18 particular criterion that I did not put in my simulated plans</p> <p>19 would necessarily cause or justify or lead to a certain</p> <p>20 change in number of municipalities being broken, etcetera. I</p> <p>21 just wanted to qualify my answer that way.</p> <p>22 Q. Right. What about preserving the cores of existing</p> <p>23 districts? That too could have an effect on the number of</p> <p>24 county lines broken or the compactness of districts. So that</p> <p>25 might well be an explanation from more county line breaks and</p>
<p style="text-align: right;">Page 83</p> <p>1 in the simulated plans.</p> <p>2 BY MR. CARVIN:</p> <p>3 Q. Well if you could turn to page 40 of your report.</p> <p>4 A. Okay.</p> <p>5 Q. I'll point you to the number of municipal breaks, this is</p> <p>6 related to the House plans. 300 simulated maps came up with</p> <p>7 13 municipal breaks, and 700 came up with 14.</p> <p>8 Is your answer essentially the same on why the</p> <p>9 difference between the two?</p> <p>10 A. Yeah, I would give the same explanation.</p> <p>11 Q. Okay. Is 14 a de minimis difference from 13, in your view?</p> <p>12 A. I'm not sure what you mean by de minimis.</p> <p>13 Q. Is it significant to you as a political scientist analyzing</p> <p>14 these plans?</p> <p>15 A. I'm not sure that a political scientist -- I'll just speak</p> <p>16 for myself. I don't really have an opinion on whether</p> <p>17 something is a de minimis difference.</p> <p>18 All I do is quantify. I can say it's a difference</p> <p>19 of one. I really don't have an expert opinion as to whether</p> <p>20 one is huge or one is tiny or de minimis.</p> <p>21 Q. If a line drawer considered factors other than the five</p> <p>22 statutory criteria, such as protecting incumbents, preserving</p> <p>23 the cores of existing districts, and preserving communities</p> <p>24 of interest, that might explain the departure from the</p> <p>25 statutory criteria, correct, relative to the simulated plan?</p>	<p style="text-align: right;">Page 85</p> <p>1 lesser compactness than the simulated plans because they</p> <p>2 didn't consider that as a criteria, right?</p> <p>3 A. Well that is a little bit of a different situation and the</p> <p>4 answer there is it depends. So I'm just going to clarify</p> <p>5 something first and then I'll give you my best shot at</p> <p>6 answering your question.</p> <p>7 So I think when you're talking about preservation</p> <p>8 of cores, my understanding, and please correct me if I'm</p> <p>9 wrong, is that you're talking about preserving the cores of</p> <p>10 the districts from the previous decade's plan. So with that</p> <p>11 understanding let me try and answer your question.</p> <p>12 So it really depends. If we had a previous</p> <p>13 decade's plan -- or I'll just call it a benchmark plan. If</p> <p>14 we had a benchmark plan that did a really poor job of</p> <p>15 following municipal boundaries, and a really poor job of</p> <p>16 following county boundaries, let's just hypothetically say</p> <p>17 they split apart one thousand different municipalities and 50</p> <p>18 counties, obviously a very extreme hypothetical. And if that</p> <p>19 were the existing benchmark plan, and a map drawer came in</p> <p>20 and said, I would like to preserve the cores of those</p> <p>21 benchmark plan districts as much as possible, the best way to</p> <p>22 do that is to draw a plan that similarly breaks apart all of</p> <p>23 those one thousand municipalities or 50 counties or whatever</p> <p>24 I said.</p> <p>25 That is an example, kind of an extreme example, of</p>



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1 where preservation of cores taken to an extreme would lead to  
2 a plan that really breaks a part of lot of municipalities or  
3 counties.  
4 Q. What if --  
5 A. At the very -- if I could just try a finish my explanation  
6 here.  
7 At the other sort of extreme, if you had a  
8 benchmark plan that does a really good job of not breaking  
9 apart counties, not breaking apart municipalities, and you  
10 had a map drawer come in and say, I'm going to try and draw a  
11 new plan that preserves those cores as much as possible, then  
12 it may well be the opposite, that trying to preserve the  
13 cores of a benchmark plan that actually minimized county  
14 breaks leads to another plan that also minimizes the number  
15 of county breaks.  
16 So that's why I said it really depends.  
17 Q. And what, for example, in this case, if the 2011 plan largely  
18 mimicked the number of county breaks in the benchmark plan,  
19 that would suggest that they were trying to achieve the same  
20 minimization of county breaks, while preserving the cores of  
21 existing districts, right?  
22 MR. YEAGER: Objection, incomplete hypothetical.  
23 You may answer.  
24 THE WITNESS: That would not necessarily lead to  
25 the conclusion that you're posing.

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1 BY MR. CARVIN:  
2 Q. Well have you examined whether or not the 2000 redistricting  
3 did a good job, as you said it in terms of preserving county  
4 lines?  
5 A. I did not analyze that.  
6 Q. Okay. Have you analyzed whether or not the existing plan  
7 does as good a job as the prior plan in terms of preserving  
8 county lines?  
9 A. Because I did not analyze the previous decade's plan for the  
10 purpose of my expert report, I can't make that comparison for  
11 you here.  
12 Q. So the hypothetical you gave me a minute ago, where the  
13 benchmark plan tried to do a good job in terms of minimizing  
14 county breaks, and the next plan sought to preserve the  
15 cores, one very natural explanation would be that they would  
16 come out with the same amount of county breaks as the  
17 benchmark plan, is that right?  
18 A. No, that would not necessarily be the case. I'd need to have  
19 more information.  
20 Q. But before you said, if they had tried to do a good job in  
21 the benchmark plan, and the new plan preserved those cores,  
22 then one would expect they would do as good a job?  
23 A. Well I said that it may well be.  
24 Q. Yes.  
25 A. It may well be the case.

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1 Q. And you haven't examined that hypothetical in Michigan, have  
2 you?  
3 A. I haven't examined the benchmark or the previous decade's  
4 plan.  
5 But what I said was that it may well be that  
6 preserving --  
7 Q. Right.  
8 A. -- the cores would mean drawing a plan that actually breaks a  
9 similarly few number of municipalities and counties.  
10 It may well also not be. There are a lot of other  
11 factors such as population changes, redrawing of the  
12 municipal boundaries, and probably many other factors that I  
13 could think of, but just haven't named yet, that would also  
14 affect the source of things.  
15 But the point is it could be, and it may not be.  
16 Q. And you haven't sought to answer that --  
17 A. I have not.  
18 Q. Okay. And you haven't explored the possibility of the fact  
19 that preserving the cores of existing districts because that  
20 was not among the five enumerated statutory criteria that  
21 were programmed in your simulation?  
22 A. Well it just wasn't one of the criteria that I followed.  
23 Q. So you don't know what the effect of somebody who sought to  
24 preserve the cores of existing districts would have on the  
25 plan here?

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1 A. That's not a question that I have analyzed for my report.  
2 Q. If there was a departure from the simulated plans that was  
3 explained by preserving the cores of existing districts, it  
4 would be false to assume that the departure from the  
5 simulated plans was caused by partisanship, correct?  
6 MR. YEAGER: Objection, incomplete hypothetical,  
7 misstates the record, hypothetical.  
8 THE WITNESS: If I could ask you to read back the  
9 question.  
10 (Record read: Q. If there was a departure  
11 from the simulated plans that was explained by  
12 preserving the cores of existing districts, it would be  
13 false to assume that the departure from the simulated  
14 plans was caused by partisanship, correct?)  
15 THE WITNESS: Okay. I think I understand the  
16 hypothetical you're asking.  
17 And my answer is that it is correct that I just  
18 wouldn't automatically assume that conclusion. I would have  
19 to do further analysis.  
20 But your question was just whether I would assume  
21 that conclusion, and my answer is I would not assume that  
22 conclusion.  
23 BY MR. CARVIN:  
24 Q. Okay.  
25 A. I would do further analysis if I were to try and answer that



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1 question.  
2 Q. What does your algorithm do with respect to the requirements  
3 of the Voting Rights Act?  
4 A. I did not explicitly program the algorithm to try and  
5 interpret and account for the Voting Rights Act in any  
6 particular way.  
7 As you -- as my report explains, I dealt with a  
8 number of majority-minority districts in surrounding areas in  
9 a particular way. And obviously I'm happy to go through that  
10 if that's responsive to your question.  
11 Q. Basically you just froze all the majority-minority districts  
12 in the state and the Senate, House and Congressional plans?  
13 A. That's a part of what I did.  
14 Q. What else did you do?  
15 A. Okay. I'll start -- I'm going to have to start with each  
16 plan individually. So I'll go through in detail and maybe  
17 you can stop me if this isn't responsive to your question.  
18 So I guess I'll start with the Congressional plan.  
19 And certainly for the Congressional plan --  
20 Q. Maybe this will be simpler, did you do anything other than  
21 freezing the majority-minority districts to account for the  
22 requirements of the Voting Rights Act?  
23 MR. YEAGER: Just to clarify, are you withdrawing  
24 the prior question?  
25 MR. CARVIN: I'm just trying to cut to the chase.

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1 MR. YEAGER: Well, if you're not withdrawing the  
2 prior question, you need to let him finish.  
3 MR. CARVIN: Yes, that's my question.  
4 MR. YEAGER: Wait, I'm sorry. I want to be  
5 precise. Did you withdraw the prior question?  
6 MR. CARVIN: Sure.  
7 MR. YEAGER: Thank you.  
8 Now you can answer the question that's on the  
9 table.  
10 THE WITNESS: Okay. I don't have any particular  
11 understanding of what I did to be, say, an interpretation or  
12 following the Voting Rights Act or not following the Voting  
13 Rights Act.  
14 I'm happy to tell you what I did with particular  
15 frozen districts, and in one case with a Flint area district.  
16 So I'm happy to talk about those, but I want to  
17 clarify at the outset that I don't have a particular  
18 understanding of what I'm doing as necessarily following or  
19 not following the Voting Rights Act.  
20 So with that, I'm happy to go into specifically  
21 what I did.  
22 BY MR. CARVIN:  
23 Q. All I'm trying to clarify at this point, Professor, is if you  
24 want to tell me how you froze the districts, I'm more than  
25 happy to have you elaborate on that. But I just want to

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1 clarify at the outset whether or not you did anything other  
2 than freeze the districts to comply with the Voting Rights  
3 Act, or was that really what you did was freeze the  
4 majority-minority districts?  
5 A. I understand your question. And I'm going to try to answer  
6 it here. What I'm also trying to be careful to do is not to  
7 characterize my answer as being responsive to the part of  
8 interpreting the Voting Rights Act. But I'm trying to give  
9 you a complete answer here.  
10 Q. Explain to me, did you freeze all the majority-minority  
11 districts?  
12 A. To my knowledge, the districts that I froze includes all of  
13 the majority-minority districts in the Congressional, the  
14 Senate and the House plans with one exception.  
15 Q. What's that?  
16 A. And there is a different -- so the area is Flint in the House  
17 plan. And I'm going to explain to you what I did.  
18 I'm going to qualify again at the outset that I  
19 don't take this to either mean following or not following the  
20 Voting Rights Act, but I'm going to explain to you what the  
21 simulation algorithm does in Flint.  
22 In the area of Flint the algorithm, it makes sure  
23 that there is -- the simulations make sure that there is a  
24 district in the Flint area that has a black voting age  
25 population, an African American voting age population of 55

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1 percent or higher.  
2 I did not freeze any Flint area districts for the  
3 purposes of the House plan.  
4 So I'm just saying that to explain what I did. And  
5 again, I'm being careful not to characterize that as either  
6 following or not following the VRA.  
7 Q. Why didn't you freeze the Flint district?  
8 A. Why didn't I freeze the Flint House district?  
9 I took the approach that I just described because  
10 Plaintiffs' counsel instructed me to do so.  
11 Q. What was the approach?  
12 A. Okay. What I was just --  
13 MR. YEAGER: Asked and answered.  
14 You may answer.  
15 THE WITNESS: The approach was that the computer  
16 requires that there be a district, a House district, a  
17 simulated House district in the Flint area that has an  
18 African American voting age population of at least 55  
19 percent.  
20 BY MR. CARVIN:  
21 Q. And could that be different than the 55 percent district in  
22 the enacted plan?  
23 A. Could the number -- could the BVAP be different?  
24 Q. No. Could the district be different even though it achieves  
25 the same BVAP?

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1 A. Okay. The district doesn't necessarily achieve the same  
2 BVAP, the district there just necessarily achieves a 55  
3 percent.  
4 And the answer is, yes, the district could well be  
5 different.  
6 Q. Okay. As I understood it with respect to, for example, the  
7 two minority-majority districts in the Congressional plan you  
8 froze the lines. You didn't come up and say, create a  
9 district with an equivalent BVAP or certain minimum BVAP for  
10 the Congressional districts. Do I have that right?  
11 A. The Congressional simulations just freeze the lines for  
12 Congressional districts --  
13 Q. Right.  
14 A. -- 13 and 14.  
15 Q. And that's -- you took a different approach with respect to  
16 the majority black district in Flint, you did not freeze the  
17 lines?  
18 A. With the House plans --  
19 Q. Right.  
20 A. -- in Flint? That is correct.  
21 Q. Okay. But you did have some district in the Flint area with  
22 a minimum of 55 percent BVAP?  
23 A. There is going to be one district in Flint.  
24 Q. Okay.  
25 A. I don't think it's -- I'm not sure that I ever specifically

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1 analyzed this completely, but I don't think it's really  
2 possible to draw two or more.  
3 Q. Okay.  
4 A. There is going to be one district in the Flint area, one  
5 House district in the Flint area with a 55 percent BVAP.  
6 Q. Was that the only majority black district in all of the plans  
7 where you didn't actually freeze the lines, the one with the  
8 House district in Flint?  
9 A. To my knowledge, to my recollection, that is. And my  
10 recollection is I analyzed the racial compositions of all the  
11 enacted districts in the various plans, and that was the only  
12 area in which I did not freeze a majority-minority BVAP  
13 district.  
14 Q. And the algorithm did not put in anything about any criteria  
15 relating to the Voting Rights Act?  
16 A. The algorithm does not really -- it's a computer. It's not  
17 really capable of making sense of or understanding the Voting  
18 Rights Act other than me putting in instructions such as  
19 freeze this district, achieve a 55 -- you know, the computer  
20 code can certainly calculate the BVAP of a district and apply  
21 that, but obviously the algorithm has no idea what the Voting  
22 Rights Act means other than me programming it that way.  
23 Q. And you didn't program it with respect, outside of the House  
24 Flint district, you didn't program it with respect to BVAP in  
25 any other district?

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1 A. I didn't -- there is no analogous place where I said, say,  
2 the districts have to have a BVAP of a certain population  
3 except obviously when you're freezing certain districts in,  
4 say for example in Wayne County, obviously you're going to  
5 achieve whatever BVAP was already there in the enacted  
6 district.  
7 Q. So your algorithm takes no account of Section 5 of the Voting  
8 Rights Act?  
9 A. That is beyond my expertise to tell you that the plans  
10 produced by an algorithm either do or do not comply with  
11 Section 5.  
12 Now I mean obviously the algorithm, it's a  
13 computer, it's not able to interpret or understand Section 5  
14 beyond the instructions I put in there, which we've been  
15 talking about here.  
16 Q. And you gave it no instructions with regard to Section 5 of  
17 the Voting Rights Act?  
18 A. I'm just not able to answer that question beyond saying the  
19 instructions that we've been talking about are the  
20 instructions that I put into the -- or put into the computer  
21 code.  
22 The algorithm doesn't -- the computer code can't  
23 tell you, and I cannot tell you whether a particular plan  
24 complies with or doesn't comply with Section 5.  
25 Q. Do you know what Section 5 of the Voting Rights Act requires?

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1 A. I'm generally aware of it, but I can't really give you any  
2 legal interpretation --  
3 Q. Give me your best --  
4 A. -- or a precise legal definition.  
5 Q. Give me your best understanding.  
6 MR. YEAGER: Objection, calls for speculation based  
7 on the prior answer, lack of foundation.  
8 You may answer.  
9 THE WITNESS: Okay. I'll give you my best shot.  
10 I'm going to start again by qualifying that I have no legal  
11 expertise on this, on the question that you're asking me.  
12 This is not part of my academic expertise to tell you what is  
13 required for a particular districting plan.  
14 And so with that qualification I'll give you my  
15 best shot.  
16 My understanding is that -- and I'm going to  
17 further qualify by -- well I'll just give you my best shot  
18 here.  
19 My understanding is that Section 4 and Section 5  
20 generally require pre-clearance for certain jurisdictions,  
21 when there are changes in things like district boundaries.  
22 And that the pre-clearance process requires submission to the  
23 Department of Justice. And that there are various rules that  
24 have been applied during that -- during that pre-clearance  
25 process. Sometimes that pre-clearance process leads to Court

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1 cases.  
2 So that's generally what I'm aware of.  
3 BY MR. CARVIN:  
4 Q. Do you know what the substantive standard of Section 5 is?  
5 MR. YEAGER: Same objection.  
6 You may answer.  
7 THE WITNESS: I'll give all the same qualifications  
8 again that I'm not qualified -- I'm not legally qualified to  
9 answer the question.  
10 I have a very general understanding that there is a  
11 retrogression standard. I can't really tell you exactly how  
12 it's applied to any particular case.  
13 (At 12:13 p.m. went off the record.)  
14 (At 1:01 p.m. went on the record.)  
15 MR. CARVIN: Okay. We can go back on the record.  
16 (At 1:01 p.m. Exhibit 2 marked.)  
17 BY MR. CARVIN:  
18 Q. Good afternoon, Professor Chen.  
19 I'd like to begin by directing your attention to  
20 what's been marked as Chen Exhibit 2, and those are the  
21 statutory criteria that you referenced, I'll represent to you  
22 in your report, MCL 4.261 and MCL 3.63, okay? And I'd like  
23 to ask you a few questions about that.  
24 MR. YEAGER: Do you have extra copies of that?  
25 MR. CARVIN: I apologize, sure.

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1 MR. YEAGER: Thank you.  
2 BY MR. CARVIN:  
3 Q. If you could turn to page 59 of your report, please.  
4 I'd like to direct your attention to the fourth  
5 sentence in the first paragraph. You state, both statutes  
6 are clear that district contiguity is an absolute inviolable  
7 principle and that county and municipal lines may be broken  
8 only for the purpose of satisfying the district population  
9 threshold requirement.  
10 That's your understanding of the statutory  
11 criteria?  
12 A. I'm just trying to get to where you are. We're on page 59,  
13 and which paragraph?  
14 Q. First paragraph, fourth sentence, begins, both statutes?  
15 A. Both statutes.  
16 Okay. I see that.  
17 Q. Okay. And that's your understanding that county and  
18 municipal lines may only be broken for the purpose of  
19 satisfying the district population threshold requirements, is  
20 that correct?  
21 A. And contiguity.  
22 Q. Yes.  
23 A. Yes.  
24 Q. Okay. And you cite on page 63 the Congressional statute for  
25 that where it says, Congressional district lines shall break

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1 as few county boundaries as is reasonably possible.  
2 And later down, Congressional district lines shall  
3 break as few city and township boundaries as is reasonably  
4 possible. Okay.  
5 My question, however, goes to the state legislative  
6 lines. Where does the Act 463 governing state legislative  
7 lines say that it shall break as few county, city and  
8 township lines as possible?  
9 A. Okay, if you'll give me a moment to review.  
10 Q. Yes.  
11 A. Okay. We're on 4.261, section (e), and my recollection of  
12 what I did is that I read section (e), that states Senate and  
13 House of Representative district lines shall preserve county  
14 lines with the least cost to the principles of equality of  
15 population.  
16 Q. Right. So that's different language than the Congressional  
17 statute which says as few as reasonably possible, but you  
18 think it means the same thing?  
19 A. Let me just compare those two.  
20 I don't know that it was necessarily my  
21 interpretation that they mean the same thing. I certainly  
22 read this part of the 4.261 statute, and obviously I spoke  
23 about it with Plaintiffs' counsel and came away with that  
24 understanding.  
25 Q. Okay.

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1 A. It wasn't something that I analyzed whether or not it was  
2 exactly the same or written the same as the Congressional  
3 statute. I just developed a, my own understanding of 4.261  
4 by reading it and consulting with Plaintiffs' counsel.  
5 Q. All right. What is your understanding of what it means when  
6 it says, shall preserve county lines with the least cost to  
7 the principle of the equality of population? What does that  
8 mean?  
9 A. My understanding of that section, and of what the statute is  
10 calling for, at least as applied to my simulations, was that  
11 district lines were going to be drawn in a way so that you  
12 were not supposed to -- one was not supposed to, say, violate  
13 the general 95 to 105 percent population requirement laid out  
14 in (d) in order to break fewer counties or fewer  
15 municipalities.  
16 So I interpreted least cost of the principle of  
17 equality meaning that you could not subordinate the  
18 population equality threshold requirement in favor of  
19 decreasing the number of county lines broken.  
20 Q. Okay. So if option one was to, say, have 95 percent  
21 population equality, without breaking the county line, but  
22 option two was to have 99 percent population equality that  
23 does break the county line, then option two would be  
24 permissible or required under this section under your  
25 understanding?

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1 A. I'm not -- I think I heard the question correctly, and so --  
2 I don't think that's quite right.  
3 What I interpreted, the way I applied this, was to  
4 say that the population equality threshold was not somehow  
5 compromised by having a 95 rather than a 99 percent populated  
6 district.  
7 And that certainly if you're choosing between those  
8 two sorts of districts, then you want to consider minimizing  
9 county breaks.  
10 Q. So you think least cost to the population principle of  
11 equality only means don't go below the 95 percent or 105  
12 percent threshold?  
13 A. My understanding is that the principle of equality of  
14 population refers to those 95 to 105 percent threshold. So  
15 there would be obviously a cost to that principle, were a  
16 district to deviate outside of the 95 to 105 percent  
17 boundaries.  
18 Q. So what do you think least cost means then? In neither  
19 instance can you go beyond the 95 to 105 percent  
20 requirements, so how do you interpret the word least cost?  
21 A. I'm not sure that I made any particular attempt to attribute  
22 any meaning to that other than the way that I just described,  
23 which is that I applied this principle by saying, it's got to  
24 be 95 to 105 percent of the ideal district population. And  
25 then within those boundaries, a district line is to be drawn

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1 so as to try to not break, not break counties.  
2 Q. This will be my last question on this. It's quite clear that  
3 the 95 to 105 percent threshold predominates over county  
4 lines regardless, right, because of the priorities you said?  
5 A. Well I gather that from (e), among other parts of the statute  
6 here.  
7 Q. Okay. All right. Let's turn to (f), right after that, okay?  
8 A. Okay.  
9 Q. Do you see (f) right underneath (e) that we were talking  
10 about?  
11 A. Yes.  
12 Q. It says, does it not, if it is necessary to break county  
13 lines to stay within the range of allowable population  
14 divergence provided for in subdivision (d), the fewer whole  
15 cities or whole townships necessary shall be shifted between  
16 two cities or townships, both of which will bring the  
17 districts into compliance with subdivision (d) and (h), the  
18 city or township with the lesser population shall be diluted,  
19 do you see that?  
20 A. Yes, I see that.  
21 Q. If you could turn to page 62 and 63 of your report.  
22 A. (Witness complied).  
23 Q. This describes what the algorithm does with county and  
24 municipal breaks. But it contains no discussion of the  
25 provision, or the concept I just talked about that in the

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1 event of a county or municipal line break, the fewest whole  
2 cities or whole townships necessary shall be shifted.  
3 Was that something you put in your algorithm?  
4 A. What the algorithm does is when it's going through, say,  
5 iterative changes and redrawing the boundaries between  
6 districts --  
7 Q. Right.  
8 A. -- it will build up a district, first in order to fill up a  
9 county. And then, say, it has to intrude into a neighboring  
10 county in order to complete the district, it will start  
11 randomly adding municipalities --  
12 Q. Right.  
13 A. -- cities and townships, and add just enough to achieve an  
14 equally populated district. So that's what the algorithm  
15 does.  
16 Q. Right. But it doesn't -- there is nothing in the algorithm  
17 that says shift as few as possible, right? If you had one  
18 district -- well, is there any provision that says shift as  
19 few as possible?  
20 A. You're asking me to read (f), is that right?  
21 Q. Yes.  
22 A. I see that on the second line there is the phrase, the fewest  
23 whole cities or whole townships necessary.  
24 Q. Right. And is there a provision in the algorithm that  
25 requires the shifting of the fewest whole cities or townships

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1 when a county line is broken?  
2 A. Well what I'm explaining is what the algorithm does is like I  
3 said when it intrudes into a new county, it adds -- it keeps  
4 on adding municipalities chosen at random and adds enough to  
5 bring it to an equally populated district.  
6 Q. So just so we're clear, you didn't have any specific  
7 directions in the algorithm to shift the fewest; you're just  
8 saying that that's what you think the result --  
9 A. It's not going to, say, create an equally populated district  
10 and then keep on adding municipalities is what I'm  
11 clarifying.  
12 Q. Right. Okay. But there is no specific directive in the  
13 algorithm to shift the fewest counties, is that correct?  
14 A. Well I'm just clarifying what the algorithm does.  
15 Q. Right.  
16 A. It adds enough just to get to an equally populated district,  
17 and then stops.  
18 Q. Right. And you're saying --  
19 A. So I think you're asking, are there are any extra steps  
20 beyond that, the answer is no.  
21 Q. Okay. Now let's assume that, for example, if you could go to  
22 the last sentence of (f), between two cities or townships,  
23 both of which will bring the districts into compliance with  
24 subdivision (d) and (h), the city or township with the lesser  
25 population shall be shifted.

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1 Was the algorithm directed, when it had a choice,  
2 to bring it into the population threshold to choose the city  
3 or township with the lesser population?  
4 **A. It was not intentionally, say, advantaging the city or the**  
5 **township with the lesser population.**  
6 Q. Okay. All right. Do you know if you -- so you didn't get  
7 into that at all.  
8 Do you know how many cities or townships were  
9 shifted, for example, in the House plans?  
10 **A. You're asking how many cities or townships were shifted in**  
11 **counties that are broken, is that right?**  
12 Q. Well obviously, yes, that would be the context in which it  
13 would arise.  
14 **A. Okay. And the answer is that I did not systematically go and**  
15 **analyze that with the enacted or simulated maps.**  
16 Q. Okay. With respect to the Senate and the House plans, do you  
17 know how close to perfect population equality the simulated  
18 plans were?  
19 **A. Let me take that one at a time.**  
20 With respect to the Senate and the House maps,  
21 perfect -- how close to perfect population, the simulated or  
22 the enacted?  
23 Q. Simulated.  
24 **A. The simulated maps.**  
25 Well, I followed the criteria, the statutory

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1 criteria regarding population equality, as I laid out in my  
2 report, as I explained. And so in general, for most  
3 districts, that threshold is 95 to 105 percent.  
4 Q. Right.  
5 **A. There are a few -- there are some exceptions to that. But in**  
6 **general it's 95 to 105 percent.**  
7 So that would be -- the ideal House district in  
8 Michigan is something like 89 thousand several hundred  
9 people. And so 95 percent of that is something in the rough  
10 ballpark of, I believe, 85 thousand, and maybe several  
11 hundred people, up to, I believe 94 thousand several hundred  
12 people. I don't have the exact numbers off the top of my  
13 head. I think some of those numbers are reported in my  
14 report.  
15 But I think you got the idea.  
16 Q. Right.  
17 **A. So in general 95 to 150 percent. And then there is -- there**  
18 **are specific places where the population equality has got to**  
19 **be more -- has got to be a bit higher than that from 98 to**  
20 **102 percent and for the House plan that applies to Grand**  
21 **Rapids --**  
22 Q. Let's put that to the side.  
23 **A. Okay. We won't go into that right now. We'll talk about**  
24 **that later.**  
25 Q. But the 98 to 1 --

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1 **A. My point is just that in general it's obviously 95 to 105**  
2 **percent. And then of course I understand in Detroit it's**  
3 **also got -- you also got that special 98 to 102 percent.**  
4 Q. I'm just talking about the general rule.  
5 The algorithm would accept plans to use your  
6 recollected numbers, either 85,000 or 94,000 in a House plan,  
7 because that would be within the plus or minus 5 percent,  
8 right?  
9 **A. We'll just call it 95 percent to 105 percent.**  
10 Q. Right. And they would accept that?  
11 **A. Yes. That's -- I mean that's the population threshold that**  
12 **the algorithm is using.**  
13 Q. And what's the average deviation into the simulated plans  
14 from the perfect 89,000 equality?  
15 **A. I'm not sure that -- the average deviation district by**  
16 **district?**  
17 Q. Well if you sum them altogether, what would be the average  
18 deviation?  
19 **A. Well I'm just going to try to remember if I ever calculated**  
20 **that.**  
21 I'm not sure that I ever would have done that  
22 calculation other than obviously to verify compliance with  
23 the 95 to 105 rule.  
24 Q. And you didn't report that in your report, right?  
25 **A. Not to my recollection.**

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1 Q. Do you know what the maximum deviation was? Was it 10  
2 percent?  
3 **A. Oh, well, I think that the maximum deviation should be 5**  
4 **percent. The point is you can go all the way up to 105 --**  
5 Q. I might not have been clear.  
6 The maximum deviation in the simulated plans ran  
7 all the way from 95 percent to 105 percent? There were some  
8 plans with 105 percent, some plans with 95 percent?  
9 **A. Oh, I see what you're asking. I'll try to be more precise to**  
10 **the best of my recollection.**  
11 I think the way the algorithm quantifies the 95 to  
12 105 percent threshold is to say you must be over 95 percent  
13 and you must be under 105 percent.  
14 Q. Right.  
15 **A. So if you are to look at the deviation between the smallest**  
16 **populated district and the largest populated district, it**  
17 **would be a little bit less than that total 10 percent band**  
18 **because I'm not allowing districts to be exactly 95 percent.**  
19 **I mean I think, I'm assuming 95 percent is actually a**  
20 **fraction, I assume. There is probably a fraction of a person**  
21 **in that number.**  
22 But the point is that I'm requiring over 95 and  
23 under 105 percent to the maximum. So the total range of the  
24 deviation will be a little bit under 10 percent. I really  
25 couldn't give you whether it's 9.9 or 9.8 percent. And

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<p style="text-align: center;">Page 110</p> <p>1 obviously that number I'm sure differs from plan to plan.</p> <p>2 Q. Did you check whether there was a partisan pattern in the</p> <p>3 over and under population? For example, were the more</p> <p>4 Republican districts overpopulated relative to the Democratic</p> <p>5 districts?</p> <p>6 A. To my recollection, I never checked that pattern that you're</p> <p>7 describing there, saying was there a correlation between,</p> <p>8 say, more underpopulated districts and whether those</p> <p>9 districts were more Democratic and more Republican.</p> <p>10 I would say that the only extent to which I'm aware</p> <p>11 that there could even potentially be such a pattern, to my</p> <p>12 knowledge, would be, say, obviously I understand that we got</p> <p>13 certain tighter population thresholds for the Detroit</p> <p>14 districts. Obviously we know that Detroit districts are more</p> <p>15 Democratic leaning, and so maybe there could be some kind of</p> <p>16 correlation there in so far as all of those districts are</p> <p>17 required to be tightly populated, something like that.</p> <p>18 It's not something that I have systematically</p> <p>19 analyzed. But obviously I'm not able to tell you that there</p> <p>20 is or is not a even small correlation along those lines.</p> <p>21 Q. Okay. And how did you deal with the issue of island</p> <p>22 townships, that part of the township is wholly within another</p> <p>23 township, how did the algorithm deal with that?</p> <p>24 A. Okay, sure. I'm going to answer that as completely as I can.</p> <p>25 I'm going to start by giving you the basis of my answer,</p>	<p style="text-align: center;">Page 112</p> <p>1 Now having separated them apart, they can be</p> <p>2 treated as a base building block for the simulation so that</p> <p>3 you can adjoin together those things and not accidentally end</p> <p>4 up with a noncontiguous district, which is the whole point of</p> <p>5 having to separate them apart.</p> <p>6 So in general, that's what I did, I separated them</p> <p>7 apart.</p> <p>8 So, for example, Michigan starts with having, I</p> <p>9 believe, I'm going to try to get the number right, I think</p> <p>10 it's 1,573 municipalities. Obviously some of them are</p> <p>11 townships with islands. So I separate apart those islands</p> <p>12 and you end up with more than 1,573 polygons in the end</p> <p>13 because I've separated apart the township islands from many</p> <p>14 of the townships. So I separate them out and treat them</p> <p>15 separately.</p> <p>16 Now obviously in the end I have to come back and</p> <p>17 treat them as a single township for the purpose of counting</p> <p>18 or identifying municipal breaks. But just for the purpose of</p> <p>19 producing a simulated plan, the computer code separates them</p> <p>20 apart and treats them separately.</p> <p>21 So that's in general, the approach that the</p> <p>22 computer code takes.</p> <p>23 There are then ways that specifically I dealt with</p> <p>24 this with respect to the House simulated plans. So after</p> <p>25 separating the noncontiguous portions of the township</p>
<p style="text-align: center;">Page 111</p> <p>1 which is the details of how I dealt with those township</p> <p>2 islands, islands within cities, is all captured and performed</p> <p>3 in my computer code that I turned over.</p> <p>4 Now having said that, I'm going to try to do my</p> <p>5 best to try to answer this succinctly without going into too</p> <p>6 much detail here, and to the best of my recollection.</p> <p>7 So in general -- and I'll speak generally for all</p> <p>8 three sets of simulations, at first. In general, what the</p> <p>9 code does is my computer code was written to, first, take a</p> <p>10 noncontiguous township island that are not contiguous from</p> <p>11 say the main portion of the township, and divide them apart,</p> <p>12 separate them apart into separate polygons.</p> <p>13 The background for this is that the shape file for</p> <p>14 the municipalities that I started with treats every single</p> <p>15 municipality as a single polygon in the shape file, that it</p> <p>16 is a single row by itself. It has the entire land area of</p> <p>17 the township, with all of its noncontiguous portions</p> <p>18 encapsulated in a single row, in a single polygon, in a</p> <p>19 single row of the shape file.</p> <p>20 Now obviously that means, for example, Ann Arbor</p> <p>21 Township would be a row consisting of some noncontiguous</p> <p>22 parts. So what I did, and my computer code did was take them</p> <p>23 apart and divide them into separate polygons, each of which</p> <p>24 itself is contiguous. So take those islands and separate</p> <p>25 them apart.</p>	<p style="text-align: center;">Page 113</p> <p>1 islands, in all of the townships, there were certain</p> <p>2 townships -- there were certain municipalities where I took</p> <p>3 township islands and integrated them back together with the</p> <p>4 city surrounding that township.</p> <p>5 So an example is Ann Arbor Township has a large</p> <p>6 number of islands, and Pittsfield Township has a large number</p> <p>7 of islands within the City of Ann Arbor. I think the same is</p> <p>8 true of Kalamazoo Township which has a number of</p> <p>9 noncontiguous islands, and some of them are wholly within the</p> <p>10 City of Kalamazoo.</p> <p>11 And for those cases, I took the township islands,</p> <p>12 say Ann Arbor Township islands, and integrated them, merged</p> <p>13 them together with the, in Ann Arbor Township -- in the case</p> <p>14 of Ann Arbor Township, it was the northern portion of the</p> <p>15 city of Ann Arbor, and for Pittsfield Township it covers the</p> <p>16 southern portion of Ann Arbor.</p> <p>17 I merged it together. And the reason I did that</p> <p>18 was to allow the algorithm the opportunity to possible see if</p> <p>19 it was going to be geographically and mathematically possible</p> <p>20 to create plans that keep, say, all of Ann Arbor Township</p> <p>21 together or all of Pittsfield Township together without</p> <p>22 separating the township islands from each other.</p> <p>23 So those were the different ways --</p> <p>24 Q. Can I just follow up on that?</p> <p>25 A. Sure.</p>

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1 Q. I just want to ask something specific about that.  
2 **A. Okay.**  
3 Q. Because I think I may have lost your thread.  
4 If it was mathematically and geographically  
5 possible was the algorithm instructed to, for example, keep  
6 the Ann Arbor townships together?  
7 **A. Yes, it treats that as a township that needs to be kept**  
8 **together, otherwise it might count as a municipal break.**  
9 Q. Okay.  
10 **A. So the algorithm, in trying to keep townships together, it**  
11 **tries to keep all the noncontiguous fragments together.**  
12 **And I'm aware that in some cases, it is just**  
13 **mathematically impossible to, but in general I set it up so**  
14 **the algorithm has the opportunity to try and do so.**  
15 Q. And that would -- for the goal of minimizing the township and  
16 city breaks?  
17 **A. Correct.**  
18 Q. Okay. Did you review the 1982 correspondence between Mr.  
19 Apol and the Supreme Court Clerk Pogue and the Supreme Court  
20 Justice Charles Levin on the Apol criteria?  
21 **A. To my knowledge, to my recollection I am not aware of that**  
22 **correspondence.**  
23 Q. Okay. If you could turn to page 40 of your report, please?  
24 **A. (Witness complied.) Yes.**  
25 Q. So I'm just really trying to make sure we're talking about

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1 Q. Okay.  
2 **A. So if it's a single district, but it breaks the county in two**  
3 **completely separate noncontiguous -- two completely different**  
4 **places of that county, I think that's what some people would**  
5 **refer to as double traversal of that county, you kind of**  
6 **intrude into the county but at two completely different**  
7 **places that don't touch one another except through another**  
8 **county, that I counted as a single break, not two separate,**  
9 **not an additional county break, but rather one single county**  
10 **break.**  
11 Q. Okay. And then right underneath that you see, the number of  
12 counties divided into multiple districts.  
13 Again, I'm just trying to clarify, would that mean  
14 if, for example, a number of districts were wholly within the  
15 county but never broke a county line, would that show up in  
16 that tabulation, that 28?  
17 **A. Yes. And that's why you see including Wayne County there, so**  
18 **obviously you're going to have to break Wayne County,**  
19 **obviously you're going to have to break Washtenaw County.**  
20 **Obviously there are several counties that inevitably will**  
21 **show up on this list. Again Wayne County counts as one**  
22 **county that is divided into multiple districts.**  
23 Q. Do you think that's a relevant criteria under the statute,  
24 how many districts you have within a county, if it doesn't  
25 break a county line?

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1 the same things here and this is just an illustrative  
2 example.  
3 You have a number of county breaks, this is for the  
4 enacted plan, you say 17 county breaks?  
5 **A. Let me just --**  
6 Q. Do you see that on the left-hand side?  
7 **A. Yes, sir. I see that.**  
8 Q. Okay. So I'm just trying to figure out, does that mean a  
9 district line broke a county line? What I'm getting at, what  
10 if a district line broke the county line twice, the same  
11 county, would you count that as one or two breaks?  
12 **A. If a district line -- if a single district --**  
13 Q. If there was ambiguity in my question, I apologize.  
14 No, let's assume different districts broke -- or  
15 the same district broke a county line twice, in two different  
16 places, would you count that as one break or two?  
17 **A. I see. I'm going to ask those two questions separately.**  
18 **If it's two different districts causing, each**  
19 **causing a county break of the same county, my recollection is**  
20 **I would call that -- I would count that as two separate**  
21 **breaks. I can't give you an example off the top of my head,**  
22 **but I think I wrapped my head around that sort of situation**  
23 **you're describing.**  
24 Q. Okay. And the second --  
25 **A. I got your second part of your question.**

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1 **A. Do I think it's a relevant criteria for the purpose of**  
2 **interpreting the statutes, for what purpose?**  
3 Q. Do you think the statute speaks to the question of how many,  
4 the number of districts are within a county without breaking  
5 a county line?  
6 **A. Okay. I would recognize that the statute does not have an**  
7 **explicit mention of this sort of number of counties divided**  
8 **into multiple districts the way that I calculated that.**  
9 Q. So what information are you conveying on this chart with that  
10 column, that row?  
11 **A. The column conveys -- that row conveys exactly what I**  
12 **described.**  
13 Q. I know, but do you think it has any relevance to compliance  
14 or adherence to the statutory criteria?  
15 **A. That's a legal question that I'm not qualified to answer.**  
16 **I'm just explaining what I did.**  
17 Q. From the -- wholly apart from legality, do you think it  
18 reflects any divergence from or adherence to what your  
19 understanding of the statutory criteria are?  
20 **A. As I said, I recognize that the statute does not have an**  
21 **explicit section or line that defines number of counties**  
22 **divided in the way that I operationalized it and quantified**  
23 **it here.**  
24 Q. Okay. If there is a choice between breaking a county line a  
25 second time, or breaking a different county line, what did



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1 the algorithm require?  
2 A. I want to try to understand your question. If there is a  
3 choice between breaking a county line a second time --  
4 Q. Right.  
5 A. -- versus breaking another completely different county.  
6 Q. Right.  
7 A. Okay. So I think the first choice that you're giving there  
8 is what we were discussing before, what I had said some  
9 people might call a double traversal.  
10 Q. Right.  
11 A. And as I said since my computer code calls that a single  
12 break, that would be treated as more preferable to the second  
13 scenario where you're saying you're going to break a whole  
14 another county, a completely different -- a completely  
15 different county.  
16 So if I'm understanding the question correctly  
17 there, the first would be what is prioritized in terms of  
18 decreasing or minimizing the number of county breaks.  
19 Q. Okay.  
20 A. Obviously the caveat being all else being equal, nothing else  
21 being violated, no population equality being violated,  
22 etcetera.  
23 Q. On page 40, you just referenced the point that the number of  
24 counties divided includes Wayne County. But if you turn to  
25 page 27 of your report that's dealing with the Senate plans,

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1 recollection is that I excluded Wayne County from the number  
2 of divided counties because Wayne was just not really even a  
3 part of the simulation process in any random sense, since all  
4 of Wayne County was carved up in exactly the same way due to  
5 those frozen districts.  
6 Now turning to the other table you referenced on  
7 page 40, that's Table 4 describing the enacted House plan and  
8 the computer-simulated House plans, you noted that I did  
9 include Wayne County in this, in this count.  
10 And the point here is that I was not freezing every  
11 single district, every single House district within the  
12 boundaries of Wayne County. The computer code froze many of  
13 them, but not all of them. So there was actually some real  
14 simulation process going on in some parts of Western Wayne  
15 County. So I included them.  
16 Again, it's not particularly meaningful if you do  
17 or not. The point is just to do it consistently so there is  
18 an apples-to-apples comparison when I'm comparing the enacted  
19 House plan to the computer-simulated plans. And in this case  
20 I chose to include Wayne County which meant that there was  
21 going to be one more county, Wayne, that was divided in both  
22 the enacted House plan as well as the computer-simulated  
23 plans.  
24 The broader point is as long as you're doing an  
25 apples-to-apples comparison using the same rules for the

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1 you exclude Wayne County from that. Why is that?  
2 A. Well, I just wrote those lines in there to make clear exactly  
3 what I was counting and how I was counting them.  
4 As to why I did it one way in one table and another  
5 way in the other table, I mean first of all I was just trying  
6 to be transparent and explain clearly what I was doing, even  
7 if it was slightly different for these two tables.  
8 In general, what I did in -- I think I'm going to  
9 start with the Senate table, which is the page 27 one you  
10 referred to. What I did in the Senate plan was I froze  
11 districts one through seven from the enacted plan, all seven  
12 districts covering the entirety of Wayne County.  
13 And what that means is that Wayne County is  
14 effectively excluded from the simulation process, all of  
15 Wayne County is. And so we all know what happens in  
16 districts one through seven. Wayne County is obviously  
17 divided into multiple districts.  
18 So it really doesn't matter if you want to include  
19 Wayne County or you don't want to include Wayne County. If  
20 you want to include Wayne County, add one to everything; or  
21 if you don't want to, subtract one, and that's what I  
22 reported. The point is to do an apples-to-apples comparison  
23 when I'm comparing the enacted plan to the computer-simulated  
24 plan.  
25 But I guess in this particular case, I just -- my

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1 enacted plan and the computer-simulated plans, that's what  
2 really matters here. Obviously Wayne County is always going  
3 to be divided up in any equally populated plan that you can  
4 draw for Michigan's House district. So it's really just  
5 adding one to both columns there.  
6 My recollection is that's generally why I included  
7 Wayne County here but not in the other, in the Senate table.  
8 Q. One last question on how you count county breaks.  
9 So if you have, if district one and district two  
10 split county line between Smith County and Jones County,  
11 okay? In other words all of district one is composed of  
12 parts of Smith and parts of Jones, all of district two is  
13 composed of parts of Jones and parts of Smith County, do you  
14 follow so far?  
15 A. Yes.  
16 Q. Okay. I assume from your prior answer, that's one -- you  
17 count that as one county break?  
18 A. And just to clarify you're telling me that neither district  
19 one or two cover any parts of any other county other than  
20 those two?  
21 Q. That's the key point, correct.  
22 A. I got you, let me think about that.  
23 I'm going to give you my best shot at answering  
24 that and I'll start by qualifying it by saying that when I  
25 counted up the county breaks in all the 3000 simulated maps,



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1 obviously I wasn't doing it by hand, I was doing it by  
2 computer code and that computer code contains the rules that  
3 I used, contains the instructions that I used to count county  
4 breaks. So it's all in that computer code that counts county  
5 breaks.

6 So what you're asking me to do here is to count,  
7 not by hand, but by thinking hypothetically about  
8 hypothetical counties, and I'll do my best, but I want to  
9 qualify by saying this is obviously not the sort of process I  
10 went through in my report to calculate county breaks.

11 So as I think I understand the district one and two  
12 Smith and Jones County situation you're setting up, that  
13 sounds to me, as I'm sitting here just thinking about it in  
14 my mind without any sort of visualization here, that sounds  
15 to me like -- that sounds to me like that's two separate  
16 county breaks. It could be thought of as Smith being shifted  
17 into Jones or Jones being shifted into Smith for both  
18 district one and district two, and so that sounds to me like  
19 two different county breaks.

20 Q. Okay.

21 A. But again same qualifications as before. I'm just visually  
22 thinking about this sort of removed-from-reality hypothetical  
23 here.

24 Q. Well to follow up here though on your qualification, these  
25 issues do arise in the real world. Do you have a specific

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1 remaining population of Smith would have to be combined with  
2 all of Jones for the second House district.

3 That sort of configuration is the sort that would  
4 be prioritized because, as I'm thinking about that  
5 hypothetical, that would be one county break. That's just a  
6 shifting of a small part of Smith into Jones.

7 And so that would be the sort of configuration that  
8 would be prioritized when you're trying to minimize county  
9 breaks.

10 Q. I don't want to explore that hypothetical too far.

11 That's true however, if Smith is not big enough for  
12 the district, it has to go somewhere to get extra population.  
13 One choice is to go into Jones to get the extra population,  
14 and whatever you take out of Jones you leave enough in Jones  
15 that if Jones went into Smith for the second population, that  
16 would be the county break.

17 If you didn't do that, then the excess population  
18 in Jones would have to go to another district to get its  
19 population. Do you follow what I'm saying?

20 And I'm just trying to figure out what the  
21 algorithm told it to do in those circumstances.

22 MR. YEAGER: Objection, incomplete hypothetical.  
23 Assumes facts not in evidence.

24 You can answer.

25 THE WITNESS: Okay. I'm not sure if you are

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1 recollection of what instructions you gave to the algorithm  
2 in these sort of circumstances when the computer is tallying  
3 up county breaks?

4 A. Well I can tell you the sort of prioritization the algorithm  
5 would inevitably give to a situation like that, because of  
6 how it's trying to minimize county breaks.

7 Inevitably, I'll stick with your example, either  
8 Smith or Jones County has the larger population of the two.  
9 And if we're talking about House districts, obviously those  
10 two counties have to sum up to roughly 180,000 or so in  
11 population because they're going to include fully two  
12 districts. And I think you're qualifying, I believe, correct  
13 me if I'm wrong, that there are no other districts within  
14 these two counties, within Smith and Jones.

15 So those two counties have to end up summing up in  
16 total population somewhere around 180,000 in population to be  
17 two full House districts.

18 I know you didn't specify House districts, but I'm  
19 adding to your hypothetical here.

20 So what the algorithm would do is it would try to  
21 only -- to draw those districts by only splitting up one  
22 county. Let's suppose that Smith is the bigger county in  
23 terms of population and Jones is the smaller county in terms  
24 population. That definitely means you would be able to fit a  
25 full House district within Smith County, and then the

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1 starting to talk a somewhat different hypothetical than what  
2 I was talking about a moment ago.

3 What I was saying is that if it is the case that  
4 these two counties, Smith and Jones combined together are  
5 roughly the size of two House districts --

6 BY MR. CARVIN:

7 Q. Right.

8 A. -- then the sort of configuration that the algorithm, that  
9 the code is going to prioritize is one in which one of the  
10 two districts is fully within the larger of the two counties.  
11 And then the smaller of the two counties will obviously have  
12 to be combined with the remaining portion of the larger  
13 county.

14 And then that would be one total county break, so  
15 that would be prioritized.

16 Q. Okay. Now assume with me that district one and district two  
17 share the Smith and Jones County population, but district one  
18 also goes out and gets a third county, whole county, how many  
19 breaks does that count?

20 MR. YEAGER: Same objection.

21 You may answer.

22 THE WITNESS: I'm starting to have a little more  
23 trouble following along. Is it all right if I take a pen and  
24 paper and try --

25 BY MR. CARVIN:

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1 Q. I will try it again.  
2 **A. Okay.**  
3 Q. We were initially talking as you just mentioned between Smith  
4 and Jones sharing all of the populations of district one and  
5 two, but now one of the districts is underpopulated, so it  
6 goes out and reaches out and gets Johnson County, okay, as  
7 well.  
8 And I'm wondering if that changes the amount of  
9 county breaks that your computer would count.  
10 MR. YEAGER: Objection, incomplete hypothetical and  
11 the witness has asked for paper.  
12 Would you like me to give him some?  
13 MR. CARVIN: You can give him all the paper you  
14 want.  
15 BY MR. CARVIN:  
16 Q. Go ahead.  
17 **A. I'm going to try and write down what you said here.**  
18 **We've got Smith County, and we've got Jones County.**  
19 **And if I'm understanding you correctly, districts one and two**  
20 **comprise -- it would comprise all of Smith and Jones County,**  
21 **have I got that right so far?**  
22 Q. You do.  
23 **A. All right. Now can you go to the last part of your question**  
24 **where you brought in Johnson County?**  
25 Q. Under that hypothetical district one is underpopulated, so it

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1 **totally have all the information I need here, but I think I'm**  
2 **able to understand what information you've given me here so**  
3 **far. And so that's my best shot at it.**  
4 **Again I'll qualify all of this by saying that**  
5 **obviously getting a pen and paper here and doing these little**  
6 **hypotheticals like I'm trying to do right here is not at all**  
7 **how I actually counted breaks in my computer code. Obviously**  
8 **I've programmed the computer to follow a series of steps to**  
9 **calculate county breaks. But I'm giving you my best shot**  
10 **here.**  
11 Q. But wouldn't the way the computer code counts the county  
12 breaks conform with your understanding of how to count the  
13 county breaks?  
14 **A. To the best of my knowledge.**  
15 Q. Okay. If you could turn to page 64 of your report, please.  
16 **A. (Witness complied.) Yes, sir.**  
17 Q. Okay. So it states, does it not, the simulation algorithm  
18 thus seeks to achieve compactness where required only after  
19 prioritizing the four aforementioned criteria. The  
20 algorithm, after doing the four, then favors districts that  
21 minimize the Michigan land area inside of each district's  
22 circumscribing circle but outside of the district itself.  
23 Is that correct?  
24 **A. Yes.**  
25 Q. Okay. And that is the measure that is specified in the

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1 goes out and reaches and brings in all of Johnson County  
2 which brings it within the population threshold. You're not  
3 breaking Johnson County line, but you're adding it to the  
4 district one you just described.  
5 Does that count as an additional county break or do  
6 you tally them up the same way as you would have under the  
7 original hypothetical?  
8 MR. YEAGER: Same objection.  
9 You may answer.  
10 THE WITNESS: Okay. I think your question is does  
11 going out and grabbing Johnson County count as an additional  
12 county break?  
13 BY MR. CARVIN:  
14 Q. That's exactly right.  
15 **A. Okay. I'm going to try my best to answer your question. I'm**  
16 **going to first start by qualifying that this seems like such**  
17 **a nonideal situation in terms of optimization of county**  
18 **breaks that it's not the sort of situation that I, to my**  
19 **recollection, I remember seeing in, say, the simulated maps**  
20 **that I analyzed.**  
21 **So my understanding of the situation is that we've**  
22 **got one county break involved with district two, just as**  
23 **before; and then we've got two county breaks involved with**  
24 **district one. So that's a total of three breaks.**  
25 **And that's -- I'm not sure -- I'm not sure I**

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1 statutory criteria?  
2 **A. I tried to -- the criteria is a little -- is maybe -- it's a**  
3 **little bit general, but I tried to faithfully follow what I**  
4 **saw in the criteria in describing this unique sort of**  
5 **compactness quantification that I saw in the statute.**  
6 Q. And that's the first measure that you did, but you also did  
7 the Reock score in addition to that, right?  
8 **A. That is -- well I calculated the Reock score of the**  
9 **districts.**  
10 Q. Okay. And you used that even though it's not in the statute  
11 for what reason?  
12 **A. Why did I use the Reock score?**  
13 Q. Yes.  
14 MR. YEAGER: Asked and answered.  
15 You may answer.  
16 THE WITNESS: I think I said earlier this morning I  
17 calculated it because it's something -- it's something that I  
18 believe I almost always do when I evaluate the compactness of  
19 districting plans, enacted plans and computer-simulated  
20 plans.  
21 BY MR. CARVIN:  
22 Q. If you'd turn to page 40.  
23 **A. (Witness complied.)**  
24 Q. Okay. Let's start with the Reock score, because that's more  
25 commonly used.

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1 The Reock score for the enacted plan is 0.415. Is  
2 there any consensus or dominant view within the political  
3 science community on what Reock score would render a plan  
4 non-compact?  
5 **A. My sense of a general view, and at the very least I'm**  
6 **speaking for myself here, and obviously again, it's not**  
7 **something I've ever taken a survey or a poll on, but there is**  
8 **not really a one-size-fits-all answer that will tell you,**  
9 **say, a .5 is a great score and a .2 is a bad score.**  
10 **When it comes to Reock it's context dependent and**  
11 **geography dependent. And you can easily see that if you**  
12 **imagine, for example, what sort of Reock score one would get**  
13 **if you were to draw some districts in the State of Hawaii, or**  
14 **say Alaska's Aleutian Islands and then calculate the Reock**  
15 **score by fitting an abounding circle around those districts.**  
16 **Of course the sort of Reock scores that one could**  
17 **reasonably expect from a districting plan in Hawaii or the**  
18 **Alaskan Aleutian Islands would be just of a completely**  
19 **different nature than if you drew, say, a district involving**  
20 **the State of Wyoming, which is just a perfect square. The**  
21 **state is a perfect square. And say if you were drawing**  
22 **Wyoming into two districts, you could expect some pretty**  
23 **compact, pretty good Reock scores.**  
24 **But obviously if you're doing that in Hawaii,**  
25 **you're going to expect a completely different sort of Reock**

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1 **scores makes clear there is no such thing as an either or**  
2 **when it comes to compactness. It's not as if there is a**  
3 **magical cutoff that turns a district from being non-compact**  
4 **into compact or vice versa.**  
5 **The point here is that this is the range, this is**  
6 **the general range of scores that one can expect from a**  
7 **computer simulation algorithm that is prioritizing**  
8 **compactness in the way that I'm trying to do here.**  
9 **Q. And .415 is outside that range?**  
10 **A. Yeah. Mathematically or statistically it's outside that**  
11 **range.**  
12 **Q. Right. And I get that statistically. I'm wondering as a**  
13 **matter of political science or otherwise, is it a significant**  
14 **difference? Is there any real difference between 0.415 to a**  
15 **0.418 in terms of the goals that redistricting plans are**  
16 **designed to achieve, are you opining on that?**  
17 **A. Well I'm certainly opining that it's statistically different,**  
18 **obviously.**  
19 **Q. Right.**  
20 **A. As to whether this can be characterized as a really, really**  
21 **severe or just a sort of small sacrifice, that's not really**  
22 **the sort of thing that I'm quantifying here beyond just**  
23 **reporting the numerical numbers here, and describing the**  
24 **results in terms of here is the statistical properties of**  
25 **distribution. This score is a statistical outlier, extreme**

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1 **score.**  
2 **So I think the consensus is that it really is**  
3 **jurisdiction dependent or context dependent. In other words**  
4 **what we can say about a good Reock score that makes for, say**  
5 **the sort of plans that were clearly prioritizing compactness,**  
6 **what sort of Reock scores would indicate an effort to try and**  
7 **prioritize compactness in Wyoming is completely different**  
8 **than the sort of Reock scores that one would expect to see**  
9 **typical plans drawn in Hawaii.**  
10 **That's what I mean by it's context dependent. And**  
11 **I think that political scientists who study redistricting**  
12 **recognize that for the most part that you're dealing with**  
13 **different geographies.**  
14 **Q. So there is no general benchmark under the Reock score, it's**  
15 **geographic specific. So for example the Reock scores for the**  
16 **House are from .418 to .435, would you suggest that that is**  
17 **the benchmark from separating a compact plan from a**  
18 **non-compact plan?**  
19 **A. No. I don't think I'm opining that at all.**  
20 **Q. You're just telling us that the enacted plan is less compact**  
21 **under the Reock score than the simulated plan?**  
22 **A. That I'm definitely saying just as a purely statistical**  
23 **matter.**  
24 **Q. Right.**  
25 **A. It's -- it's not as if -- and certainly looking at Reock**

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1 **statistical outlier.**  
2 **But I'm not actually taking that statistical**  
3 **conclusion and telling you, for example, that this somehow**  
4 **proves that compactness was only factored one-fifth as much**  
5 **as it should have been or anything like that that would say**  
6 **anything more substantive than just the statistical**  
7 **properties that I've described.**  
8 **Q. Can you cite an article or a case which has ever attributed**  
9 **significance in a substantive way to the kind of differences**  
10 **we see between 0.415 and 0.418 to 0.435?**  
11 **A. Well obviously you're giving specific numbers and I'm sure**  
12 **there has never been a scholarly number that has precisely**  
13 **these --**  
14 **Q. That's a very literal interpretation of my question. Let me**  
15 **do --**  
16 **A. I get your question and --**  
17 **Q. Let me rephrase it since you're going to interpret it**  
18 **literally.**  
19 **Have you ever seen a case or scholarly article that**  
20 **ever ascribed substantive significance to the kinds of**  
21 **differences reflected on page 40 between the simulated and**  
22 **the enacted plans?**  
23 **A. Sure. I get the general question you're asking me, you're**  
24 **basically asking me if anybody has ever used this method,**  
25 **this abstract method of comparing.**

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1 Q. No.  
2 **A. Okay.**  
3 Q. Let's assume it's one alternative plan versus another and  
4 they have differences analogous to those between the  
5 simulated plans and the enacted plans. Has any Court ever  
6 suggested that that's a significant or meaningful difference  
7 in compact --  
8 MR. YEAGER: Calls for a legal conclusion.  
9 You can answer.  
10 THE WITNESS: I was just going to say that  
11 obviously I'm not qualified to tell you if a Court has  
12 interpreted something one way or another way.  
13 BY MR. CARVIN:  
14 Q. So you're unaware of any Court cases that have done that?  
15 **A. Not to my knowledge.**  
16 Q. Is there any scholarly article, which is in your area of  
17 expertise, that has attributed any substantive significance  
18 to the kind of differences between the enacted plans' Reock  
19 scores and the Reock scores expressing the range of the  
20 simulated plans?  
21 **A. Okay. That was a little bit of a different question than**  
22 **what you asked previously. So I'll answer that question now.**  
23 **And the answer is, yes, I have done so in my**  
24 **scholarly, in my peer review and academic work.**  
25 **So, yes, I am aware.**

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1 Q. Anybody besides you?  
2 **A. You know, if you're asking has there been another article**  
3 **that uses some kind of computer-simulation redistricting**  
4 **algorithm and does all, does these sorts of things where you**  
5 **draw a bunch of alternative plans and compare it to an**  
6 **enacted plan, in general I would say that, one, there is just**  
7 **not a whole lot of literature doing that.**  
8 Q. So the answer is no?  
9 **A. Well I'm going to answer your question.**  
10 Q. Maybe if you could answer it yes or no and then explain, that  
11 would be good.  
12 **A. Okay. I appreciate that.**  
13 **I'm not specifically aware. It's possible that it**  
14 **has happened and it's possible it has not.**  
15 Q. Let's take out the simulation from the hypothetical.  
16 MR. YEAGER: I object, he wanted to give a longer  
17 answer. You said he could answer yes or no and then explain,  
18 so are you going to let him explain?  
19 BY MR. CARVIN:  
20 Q. Sure.  
21 **A. I was just going to briefly qualify that. It's not as if**  
22 **there is decades and decades of peer-reviewed articles doing**  
23 **exactly this sort of method that I'm doing here.**  
24 Q. Okay. So let's take that out, forget the simulated plans.  
25 Alternative plans that reflect roughly the Reock

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1 scores that you found in the simulated plans versus an  
2 enacted plan, has any scholarly article attributed  
3 substantive significance to that difference?  
4 **A. Enacted plans to an alternative plan is what you're asking**  
5 **about now?**  
6 **I can't specifically think of one off the top of my**  
7 **head, but I really don't have much doubt, given what I**  
8 **generally know which is that there is lots of literature**  
9 **describing say the Reock scores, the Polsby-Popper scores,**  
10 **etcetera, of various districting plans, I have no doubt that**  
11 **there certainly have been articles that compare one plan to**  
12 **another.**  
13 **Now was it specifically an enacted plan versus a**  
14 **computer-simulated plan, or a plan proposed by somebody that**  
15 **was not officially enacted? I don't know that I can**  
16 **specifically answer that precisely or if I could specifically**  
17 **recall of an instance like that. But I don't doubt in**  
18 **general that there has certainly been articles that have**  
19 **compared one plan to another along Reock or Polsby-Popper or**  
20 **some other similar measure.**  
21 Q. And in those articles does it say a difference, analogous to  
22 the difference between the enacted plan and the simulated  
23 plans would be substantively significant?  
24 **A. I'm going to have you ask that again.**  
25 Q. Would the differences in the Reock scores between the enacted

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1 plan and the simulated plans would be substantively  
2 significant, any such articles?  
3 **A. I'm still not sure that I understand the question.**  
4 Q. Are there any articles which suggest the differences  
5 analogous to that between the enacted plan and your range of  
6 the simulated plans would be substantively significant?  
7 **A. Okay. You're talking about the difference that we're seeing**  
8 **here on Table 4 on page 40, have I got that right?**  
9 Q. Yes.  
10 **A. Okay, I got you, I misunderstood what you were asking about**  
11 **earlier.**  
12 MR. YEAGER: No, you understood.  
13 THE WITNESS: I can't specifically recall that.  
14 I'm sure that there have been articles talking about  
15 differences, calculating mathematical differences between two  
16 different plans in terms of their Reock score.  
17 I can't really give you precisely what those  
18 authors might have said about what -- their opinion about  
19 what a significance difference is. I can't specifically  
20 recall.  
21 BY MR. CARVIN:  
22 Q. How does a 0.415 Reock score compare generally to the  
23 compactness of Congressional plans throughout the nation, do  
24 you know?  
25 **A. Throughout all 435 districts is what you're asking --**

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1 Q. No, I didn't think you were giving me Reock scores for  
2 individual districts. You were giving me for the entire  
3 Congressional districting plan. How does 0.415 stack up  
4 among analogous Congressional districting plans in the United  
5 States, do you know?  
6 **A. It's not something I've thoroughly analyzed. I can generally**  
7 **say, as I said sometime early, that obviously Reock scores**  
8 **are very context and geography dependent.**  
9 **So I can say for example, with pretty good**  
10 **certainty, that say a .415 is a low score in comparison to**  
11 **Wyoming's Congressional district. That I'm comfortable**  
12 **guessing about even though I've not specifically calculated**  
13 **the Wyoming Reock score.**  
14 **And I'm also pretty comfortable saying --**  
15 Q. Do you know how many Congressional districts there are in  
16 Wyoming?  
17 **A. There is one.**  
18 Q. So at this point you're being facetious?  
19 **A. No. I'm just --**  
20 Q. I just want to know at this juncture do you have any sense of  
21 where this stacks up among comparable redistricting plans?  
22 **A. Okay, comparable --**  
23 MR. YEAGER: Objection, characterization.  
24 You may answer.  
25 THE WITNESS: Okay. So comparable redistricting

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1 very similar to the number of districts in Michigan. But  
2 North Carolina's geography, underlying geography is quite  
3 different from Michigan. Michigan has a lot more coast line  
4 than North Carolina does.  
5 So I'm not sure that comparing Reock scores from  
6 Michigan to North Carolina would be terribly helpful.  
7 But my overall answer to your question is in the  
8 context of that kind of stuff, I haven't down that kind of  
9 study. I haven't really tried to identify states comparable  
10 to Michigan and directly compare the Reock scores. I'm not  
11 sure that such a study makes much sense to me.  
12 BY MR. CARVIN:  
13 Q. All right. Could you turn to page 64 of your report, please?  
14 **A. (Witness complied.)**  
15 Q. Okay. And this is sort of repeating what I read to you  
16 before. But just to confirm, after the algorithm takes care  
17 of the first four factors, the algorithm then favors  
18 districts that minimize the Michigan land area inside of each  
19 district circumscribing circle but outside of the district  
20 itself.  
21 Is that right?  
22 **A. Oh, it favors districts that are more compact.**  
23 Q. Right. And are you suggesting that the statute favors or  
24 requires minimizing Michigan land area inside of each  
25 district's circumscribing circle?

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1 plans. I'm just going to -- I'm trying to understand the  
2 question as best as I can.  
3 BY MR. CARVIN:  
4 Q. No, you're not. But go ahead.  
5 MR. YEAGER: Objection. I object to the  
6 characterization. The witness is answering your questions to  
7 the best of his ability and it's inappropriate for you,  
8 Counsel, to make comments on what he's trying do. He's  
9 trying to answer your questions to the best he can.  
10 If you ask a clear question, and, yes, he will take  
11 you literally, and he will give you a clear answer.  
12 And I really object to your making comments about  
13 his intent that they're inaccurate and they're inappropriate.  
14 Now if there is a question on the table, you can  
15 answer it; if there is not a question on the table, let's  
16 wait for a question.  
17 THE WITNESS: So I think you just clarified by  
18 talking about comparable districting plans. You didn't say  
19 exactly what comparable means but I'm going to -- I think you  
20 could say comparable in terms of the number of Congressional  
21 districts. So if there were other states that had 14 or say  
22 close to 14 Congressional districts.  
23 And my answer there is even then, it's still very  
24 context dependent, very geography dependent. Obviously a  
25 state like North Carolina has 13 Congressional districts,

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1 **A. I'm not giving an opinion about what the statute legally**  
2 **requires or doesn't require.**  
3 **All I'm doing, obviously, is reporting to you --**  
4 **reporting here on what I actually did in the algorithm.**  
5 Q. Right.  
6 **A. So I'm describing how I operationalized the criteria that I**  
7 **understood.**  
8 Q. And you're not suggesting that your, how you operationalized  
9 the criteria reflect what the statute uses as operational  
10 criteria, right?  
11 **A. Well I certainly read the statute. But I am not giving an**  
12 **opinion on whether a particular reading of the statute that I**  
13 **operationalized it as is legally required or is prohibited or**  
14 **some other legal judgement. I'm just telling you about what**  
15 **I did, how I operationalized the criteria that I read.**  
16 Q. So you're not in any way opining that the statute favors  
17 districts that minimize the Michigan land area inside of each  
18 district's circumscribing circle, right?  
19 **A. I'm not opining on whether something is legally required or**  
20 **not.**  
21 Q. Or whether the statute encourages that?  
22 **A. You're saying encourages the legislature? Have I got that**  
23 **right?**  
24 Q. I'm just trying to figure out why you put this into your  
25 algorithm.

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1     **A. Okay.**  
2     Q. This idea of minimizing the compactness. If it doesn't come  
3     from the statutory criteria, I assume it's your own personal  
4     idiosyncratic view of redistricting. Am I wrong about that?  
5     **A. What I said is that I have no view as to whether the statute**  
6     **requires or even encourages in any legal sense. Obviously**  
7     **I'm also telling you about what I did in my own computer**  
8     **code. And I'm saying that I understood the criteria, and I**  
9     **operationalized the criteria in this particular way.**  
10    Q. Was your personal --  
11    **A. So I --**  
12    Q. -- understanding of the criteria that you needed to minimize  
13    the compactness --  
14    **A. If I could just finish my answer to the question.**  
15        **I am just saying that this is how I operationalized**  
16        **it. And so I don't know if that -- I don't really reach any**  
17        **conclusion regarding, say, require or encouraged beyond this**  
18        **is what I did to operationalize it.**  
19        **I apologize for interrupting you.**  
20    Q. Did you do that because your understanding was that the  
21    statute encouraged line drawers to minimize the Michigan land  
22    area inside of a district's circumscribing circle after  
23    taking account of the first four criteria?  
24        MR. YEAGER: Asked and answered.  
25        You may answer.

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1           THE WITNESS: I didn't take any opinion -- I don't  
2    have an opinion on how the statute affects line drawers,  
3    which is the term you just used.  
4    BY MR. CARVIN:  
5    Q. Why did you do it in your algorithm?  
6    **A. Why did I prioritize compactness, why did I pursue**  
7    **compactness?**  
8    Q. In the way -- yes.  
9    **A. Okay, sure. And the answer is the same with respect to**  
10   **compactness as with respect to the other criteria that I**  
11   **operationalized in my code.**  
12        **I read the statute, I consulted with Plaintiffs'**  
13        **counsel, and I determined the criteria that I was going to**  
14        **computerize or build into the computer code.**  
15    Q. Did Plaintiffs' counsel tell you that the statute encourages  
16    minimizing compactness in districts?  
17        MR. YEAGER: Well I'm going to object.  
18        You can testify as to what instructions you were  
19    given. I'm going to object to, and instruct you not to  
20    answer as to discussions that may have occurred with counsel  
21    that are protected by Rule 26 and work product outside of  
22    whatever instructions you were given.  
23        You may answer.  
24        THE WITNESS: I can't answer your question and  
25    follow Mr. Yeager's instructions to me.

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1     BY MR. CARVIN:  
2     Q. Were you instructed to create districts that minimized or  
3     maximized compactness as you described it in your report?  
4           MR. YEAGER: You may answer that question.  
5           THE WITNESS: Okay. My understanding of my  
6     discussions with Plaintiffs' counsel was that compactness was  
7     to be pursued in the way that I prioritized it here, which  
8     obviously again is beyond the -- beyond the first four  
9     criteria that we've mentioned earlier. That beyond that,  
10    districts are to be favored when they're more compact rather  
11    than less compact.  
12           So that was generally my understanding of what I  
13    was going to analyze.  
14    BY MR. CARVIN:  
15    Q. Okay. But that's not your understanding of what the statute  
16    encouraged? You were doing that because Plaintiffs' counsel  
17    told you to do that, not because you had any independent view  
18    that that's what the statute encouraged, right? Do I  
19    understand that correctly?  
20    **A. To the best of my recollection, that's correct.**  
21    Q. Okay. We can go through it, but there is nothing in -- and  
22    you can review this all you want, in either the congressional  
23    or state legislative statute, is there, that says you favor  
24    districts that maximize compactness after the first four  
25    criteria have been satisfied, right?

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1     **A. My understanding is that there are portions in the statutes**  
2     **where drawing -- where maximizing compactness is explicitly**  
3     **called for in some circumstances.**  
4     Q. Yes. Let's identify those circumstances.  
5           If you look to the 1999 plan on congressional  
6     redistricting, if you look at (c)(vi), it says, within the  
7     city or township to which there is apportioned more than one  
8     Congressional district, district lines shall be drawn to  
9     achieve the maximum compactness possible.  
10           So in those circumstances the line shall be drawn  
11    to achieve the maximum compactness possible, right?  
12    **A. I see that.**  
13    Q. Is there any other circumstances where the statute references  
14    maximum compactness of districts or lines?  
15    **A. Well I see that right after that there is a general provision**  
16    **on compactness and how one is to understand compactness.**  
17    Q. All right. In addition to -- I'll repeat it. In addition to  
18    (c)(vi) is there any other part of the statute which requires  
19    or encourages drawing districts to maximum compactness?  
20           MR. YEAGER: Objection, calls for a legal  
21    conclusion.  
22           You may answer.  
23           THE WITNESS: I can't give you an expert opinion on  
24    what the statute requires or encourages. I can tell you  
25    about the words on the statute.

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1 BY MR. CARVIN:  
2 Q. Okay.  
3 **A. And if that's all you're asking about, I can affirm for you**  
4 **that there is not another place other than where we've just**  
5 **read from that says maximize compactness.**  
6 Q. And the one you referenced, because you are able to read the  
7 statute, simply tells you how to determine compactness. It  
8 doesn't say that they favor compactness relative to other  
9 alternatives, right?  
10 **A. I see that it just -- that next section just tells us --**  
11 Q. Right.  
12 **A. -- a quantifiable measure of compactness.**  
13 Q. Right. And those are the only two references to compactness  
14 in the Congressional statute, correct?  
15 **A. Yes.**  
16 Q. Okay. We can look at the state legislative one, the act of  
17 1996.  
18 **A. Okay.**  
19 Q. I can make this short or long. Doesn't it essentially say  
20 the same thing as the Congressional statute that we just went  
21 through?  
22 **A. I'm happy to tell you I'll give you all the same answers**  
23 **there.**  
24 Q. Okay, great.  
25 All right. If you could turn to page 14 of your

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1 paragraph is talking about.  
2 **A. Okay, I gotcha.**  
3 Q. The first finding is that the enacted plan is more  
4 pro-Republican than the simulations. Is that correct?  
5 **A. That is generally what I'm describing in that**  
6 **third-from-bottom paragraph.**  
7 Q. And then the Congressional plan is outside the compactness  
8 range of all thousand simulated maps, right?  
9 **A. I see that in the next-to-the-last paragraph.**  
10 Q. And from that you conclude, these findings suggest that the  
11 enacted Congressional plan was drawn under a process in which  
12 a partisan goal, the creation of nine Republican districts  
13 predominated. I am thus able to conclude with over 99.9  
14 percent statistical certainty that the enacted Congressional  
15 plan created districts less compact than what would have  
16 reasonably emerge from the districting process not driven by  
17 partisan intent. Is that your conclusion?  
18 **A. Yes, I see that.**  
19 Q. Okay. Well, the basis -- what is the Reock score that, or  
20 circumscribed scores that would have emerged from a  
21 districting process not driven by partisan intent?  
22 **A. Okay. What I mean in that last sentence is a process -- a**  
23 **process that I simulated, that I programmed using my computer**  
24 **code, that's what I'm referring to when I'm talking about a**  
25 **districting process not driven by partisan intent.**

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1 report.  
2 **A. I just want to point out if there is an opportunity for me to**  
3 **use the restroom, I'd be very appreciative.**  
4 Q. Can we go three more minutes?  
5 **A. Sure.**  
6 Q. I have a few more questions, but just generally whenever you  
7 need to take a break, Professor, just raise your hand.  
8 MR. YEAGER: Is that okay, three more minutes?  
9 THE WITNESS: Sure.  
10 BY MR. CARVIN:  
11 Q. Okay. This page, I'll give you a chance to review it,  
12 discusses the differences between the compactness of the  
13 enacted Congressional plan and the other plans. And we've  
14 already talked about the differences that we identified.  
15 **A. I just want to -- I want to orient myself, we're on page 14?**  
16 Q. Yes.  
17 **A. Which paragraph?**  
18 Q. I'm about to direct your attention to the prior paragraph but  
19 I want to make sure you understand the context I'm about to  
20 read. So please take your time to read the preceding  
21 paragraphs.  
22 MR. YEAGER: I didn't catch that.  
23 BY MR. CARVIN:  
24 Q. Please read the two paragraphs above the bottom paragraph to  
25 make sure that I'm not misleading you about what the bottom

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1 Q. And it was also a districting process that was driven by a  
2 command to favor the most compact districts, right?  
3 **A. I am favoring compactness as one of multiple criteria, we've**  
4 **talked about this before.**  
5 Q. Right.  
6 **A. Obviously there is a hierarchy of priority, and I think we**  
7 **talked about that before.**  
8 **But I think I understand your question. You're**  
9 **asking what sort of compactness scores would emerge under**  
10 **such a nonpartisan process such as my computer -- my computer**  
11 **algorithm.**  
12 Q. A nonpartisan process that didn't maximize compactness, might  
13 well have produced a Reock score similar to the enacted plan,  
14 correct?  
15 **A. A nonpartisan process that did not maximize compactness, that**  
16 **did not pursue compactness as one of those five goals?**  
17 Q. Yes.  
18 **A. I did not analyze that, so I really can't give you an expert**  
19 **opinion on what sort of compactness scores would have emerged**  
20 **if my algorithm had completely ignored compactness. Because**  
21 **you're asking me about essentially a compactness-blind**  
22 **algorithm, not necessarily one that disfavors compactness,**  
23 **but is just completely blind. That's an empirical question,**  
24 **I haven't tried to answer that --**  
25 Q. Have you tried to ask the empirical question that sort of



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1 favors compactness but not as much as your algorithm?  
2 Wouldn't that be another explanation for why it departs from  
3 the Reock and the other scores produced by the thousand  
4 simulated plans?  
5 **A. In general I'm not really sure by what's meant by sort of**  
6 **favoring compactness but not totally, whether that means**  
7 **favoring compactness, but only in odd number districts,**  
8 **something like that. It's not something I've tried to**  
9 **analyze.**  
10 **I wasn't interested in what sort of plans would**  
11 **emerge if only some districts were drawn to be compact, but**  
12 **others were not. I can't answer that.**  
13 MR. YEAGER: So the witness has asked for a break  
14 and it's been awhile. Can we take a break?  
15 MR. CARVIN: Yes. Thank you.  
16 (At 2:17 p.m. went off the record.)  
17 (At 2:28 p.m. went on the record.)  
18 MR. CARVIN: Back on the record.  
19 BY MR. CARVIN:  
20 Q. Just to follow up on what we were chatting about before the  
21 break, Professor, what is the basis for your assertion that  
22 the lower Reock and other scores in the enacted plan was  
23 driven by partisan intent rather than a decision by whoever  
24 drew those plans that they wouldn't maximize compactness to  
25 the extent that your algorithm does?

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1 **A. Okay, I'll explain the basis of my answer.**  
2 **I am comparing two situations here and putting**  
3 **together two sets of findings. And obviously I'm putting**  
4 **together findings regarding the partisan outlying nature of**  
5 **the enacted plan as compared to the computer-simulated**  
6 **processed plans.**  
7 **And then I'm putting together that with my finding**  
8 **regarding the statistically outlying nature of the Reock**  
9 **score and the compactness scores as defined by the statutory**  
10 **criteria. And as we talked about sometime earlier today,**  
11 **those Reock and compactness scores that I calculated, so I'm**  
12 **putting together those two findings.**  
13 **And I'm saying that it is -- how likely it is that**  
14 **the plan that we're seeing here was one that was produced by**  
15 **the sort of nonpartisan process that the computer was**  
16 **programmed to follow, and I'm finding that to be very**  
17 **statistically unlikely because of its partisan outlying**  
18 **nature.**  
19 **So putting those findings together leads me to**  
20 **conclude that it's something to do with the partisan outlying**  
21 **nature of the plan, that was related to the statistically**  
22 **outlying nature of the compactness scores that I was**  
23 **reporting on.**  
24 Q. Right. But they could have lower or worse compactness scores  
25 simply because they didn't emphasize compactness as much as

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1 your algorithm, right?  
2 **A. I wasn't analyzing that hypothetical as a, say an alternative**  
3 **hypothesis.**  
4 Q. So the answer to me is, yes, it's certainly possible?  
5 **A. I have no basis for saying that it is or is not. I'm just**  
6 **telling you that I did not analyze that hypothetical that**  
7 **you're putting forward to me.**  
8 Q. But nonetheless, you wrote down in your report that you can  
9 state with over 99.9 percent statistical certainty that the  
10 enacted Congressional plan created districts less compact  
11 than that would have reasonably emerged from a districting  
12 process not driven by partisan intent.  
13 **A. Yes.**  
14 Q. Well what if it was a process that was not driven by partisan  
15 intent, but wasn't driven by compactness?  
16 **A. Same answer as before. That is not what, the analysis I'm**  
17 **referring to right here.**  
18 **What I was saying before is that what I mean in**  
19 **that last sentence, when I'm saying emerged from a**  
20 **districting process not driven by partisan intent, I'm**  
21 **describing the process I programmed.**  
22 Q. So really what you're saying is that reasonably would have  
23 emerged from your districting process that was not driven by  
24 partisan intent. Is that right?  
25 **A. That's what I said sometime ago and that's what I'm saying**

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1 **now too.**  
2 Q. Okay.  
3 **A. What I'm referring to here is the analysis that I did**  
4 **comparing the enacted plan to the actual process that I**  
5 **modeled, that I programmed, and I'm drawing conclusions by**  
6 **comparing those two things.**  
7 Q. Right. So it would be accurate to say that you can conclude  
8 with over 99.9 percent statistical certainty that the enacted  
9 Congressional plan created districts less compact than what  
10 would have reasonably emerged from your algorithm, right?  
11 **A. That's correct.**  
12 Q. Okay. And throughout this report you make similar comments  
13 about you can state with 99.9 percent statistical certainty  
14 about the partisan intent of the line drawers, right? I can  
15 point it to you, but the one we just read is a good example.  
16 **A. Well I am --**  
17 MR. YEAGER: Let him ask a question.  
18 BY MR. CARVIN:  
19 Q. So the question is, you don't describe how you computed the  
20 level of statistical certainty. I'm going to assume that you  
21 did the sort of normal confidence interval analysis, the 99  
22 percent confidence?  
23 **A. Well here it is a 99.9 confidence interval, but I think were**  
24 **both talking about the same thing.**  
25 Q. Right. So you look at the thousand simulated plans and you



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1 see the enacted plan as not within the thousand, so you can  
2 state to a very, very high degree of statistical certainty  
3 that that would not have been produced if somebody followed  
4 your algorithm?  
5 **A. Okay. Now that you've said that, I think we're talking about**  
6 **slightly different things.**  
7 **Q. Okay.**  
8 **A. I'd be happy to clarify that.**  
9 **Q. Right.**  
10 **A. It's not literally just looking at the middle 99 or 95**  
11 **percent or whatever, and saying is the enacted plan within.**  
12 **That's certainly one thing that you can do.**  
13 **But when I'm talking about statistical certainty**  
14 **what I'm specifically talking about are basic statistical**  
15 **tests that we would do to characterize a statistical**  
16 **distribution.**  
17 **Q. Did you describe those statistical tests in your report?**  
18 **A. I described the results of them by saying --**  
19 **Q. Okay. It would be helpful if you'd listen to my question.**  
20 **Did you describe those tests in your report?**  
21 **A. I only described the results of tests.**  
22 **Q. Right.**  
23 **A. I didn't describe, say, the underlying methodological**  
24 **foundations of those basic statistical tests.**  
25 **Q. Okay. And would those differ in any way from the 95 percent**

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1 **exhaustive list of all the possible ways one could produce a**  
2 **nonpartisan plan in compliance with these criteria.**  
3 **I'm designing an algorithm as best as I can using**  
4 **the criteria that's put forth to me, that's all I'm doing**  
5 **here.**  
6 **Q. Right.**  
7 **A. I'm not giving you an exhaustive list of, say, if you had a**  
8 **commission draw a redistricting plan it would or would not be**  
9 **nonpartisan, or anything like that. I'm just describing my**  
10 **own computer process.**  
11 **Q. And that is one subset of nonpartisan plans the way you did**  
12 **it, but it doesn't exhaust the universe of nonpartisan plans,**  
13 **right?**  
14 **A. Sure. Obviously I recognize it as possible for a human to go**  
15 **out and draw a nonpartisan plan. And I'm not trying to**  
16 **somehow deny that that is a possible way to draw a**  
17 **nonpartisan plan.**  
18 **Q. For example, a plan that disagreed with your interpretation**  
19 **to statutory criteria, but didn't consider partisanship,**  
20 **wouldn't be captured by your simulated plans, right?**  
21 **A. Well to the extent that such a process might not be exactly**  
22 **the same as what I programmed in the computer code, obviously**  
23 **those could very well end up with slightly different**  
24 **districting plans.**  
25 **Q. Sure.**

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1 confidence interval test? Would they tell you something more  
2 statistically?  
3 **A. A moment ago when I told you I thought we were talking about**  
4 **the same thing, then you asked another question and I**  
5 **realized you were actually talking about something a little**  
6 **bit different than the sort of statistical tests that I'm**  
7 **referring to.**  
8 **I'm happy to go into in it in some detail here if**  
9 **you feel that's responsive. But I'll let you tell me what to**  
10 **answer.**  
11 **Q. Well I'm trying to figure out exactly what you're**  
12 **statistically certain about and maybe we can come back to the**  
13 **test, right?**  
14 **You're saying that your algorithm process was**  
15 **nonpartisan, right?**  
16 **A. Yes.**  
17 **Q. Okay. And your algorithm process adhered to be statutory**  
18 **criteria as you interpreted them or as Plaintiffs' counsel**  
19 **told you to interpret them, right?**  
20 **A. As I operationalized them.**  
21 **Q. All right. And you are you saying that that simulation is**  
22 **the only way you could do a nonpartisan redistricting plan**  
23 **not designed to enhance Republican representation?**  
24 **A. No, I'm not testifying to that, I'm not opining on that. I'm**  
25 **not, say, coming up with an opinion to say here is an**

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1 **A. The point is obviously not that I am saying that this**  
2 **computer code is the exhaustive list of all possible ways, as**  
3 **somehow the only way that anybody could ever produce a**  
4 **nonpartisan districting plan.**  
5 **Q. Okay. So then what is your statistical certainty analysis**  
6 **based on, whether it's the 95 percent confidence, other than**  
7 **a comparison of your simulated plans to the enacted plan?**  
8 **A. Well it is actually just that, it's a comparison of a**  
9 **simulated to the enacted plan.**  
10 **Are you asking me about the methodology or are you**  
11 **just asking me about the fact that I'm comparing simulations**  
12 **to the enacted plan?**  
13 **Q. And that your levels of statistical certainty are based on**  
14 **comparison of the simulated plans to the enacted plan, which**  
15 **I think you just answered.**  
16 **A. It is. What I was trying to clarify a moment ago is that I**  
17 **don't think you had quite correctly described the statistical**  
18 **methodology by which I'm arriving at, say, the statement on**  
19 **page 14 about 99.9 percent statistical certainty.**  
20 **But I think you got it correct with respect to the**  
21 **fact that I'm obviously comparing simulated plans to the**  
22 **enacted plan.**  
23 **Q. Okay. Are you contending that the thousand simulations are a**  
24 **random sample of all nonpartisan plans?**  
25 **A. I was not even interested in characterizing the whole**

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1 universe of all possible nonpartisan plans, especially if  
2 they're not drawn pursuant to the criteria that I am building  
3 into my computer code.  
4 So that's not a question I would have been  
5 interested in seeking to analyze.  
6 Q. So you didn't use any of the methods that people could use to  
7 figure out whether your thousand simulated plans are a  
8 representative sample of all potential nonpartisan  
9 redistricting configurations?  
10 MR. YEAGER: Objection, assumes facts not in  
11 evidence.  
12 You may answer.  
13 THE WITNESS: Okay. Compared to all possible  
14 nonpartisan redistricting plans.  
15 I don't know if your question is seeking to include  
16 even plans that are not drawn with pursuit of the criteria  
17 that I programmed into my algorithm. Obviously I was only  
18 trying to produce the sort of plans that followed the  
19 criteria as I've laid out in my computer code and as I've  
20 described in my report.  
21 So I'm not interested in, for example, the broader  
22 set -- the broader universe of plans that are not drawn in  
23 pursuit of these criteria. It's just not something I  
24 analyzed.  
25 BY MR. CARVIN:

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1 your simulated plans and the enacted plans, right?  
2 A. Right. I'm comparing the partisanship of the enacted to the  
3 simulated plans.  
4 Q. Okay. Did you look -- so let's go back, I guess, to page 40.  
5 This would be helpful.  
6 So again, we've been over this, the simulated maps  
7 have 14 county breaks and the enacted plan according to you  
8 has 17, right?  
9 A. Yes. I see that row here.  
10 Q. Did you compare the number of county breaks or any of the  
11 other criteria in the enacted plan to the alternatives that  
12 were proposed during the legislative process?  
13 A. You're referring to the plans that the legislature drew  
14 during the current decade's redistricting process, or  
15 proposed?  
16 Q. Either proposed by legislators or anybody else.  
17 A. I'm not sure that I've ever had access to those maps or those  
18 files. So to my recollection, I've not analyzed that  
19 question.  
20 Q. So you don't know whether or not the number of county breaks  
21 and all the other criteria equal or exceeded the proposed  
22 alternatives that were available to the legislature at the  
23 time?  
24 A. To my recollection, I don't believe I had the basis to answer  
25 that question. I'm just -- I'm trying to remember as

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1 Q. Okay. And all of your plans have fewer county and municipal  
2 breaks than the enacted plan, right?  
3 A. Are we talking about the Congressional?  
4 Q. I'm actually -- you can look at them all, for the  
5 Congressional, Senate and House.  
6 A. Okay. And you're asking about county breaks, right?  
7 Q. Is it true that the enacted plan has more county breaks in  
8 all three plans than in your range of simulated plans?  
9 A. I believe so, that's my recollection.  
10 Q. Are you contending that they subordinated county breaks in  
11 order to achieve partisan end?  
12 A. I'm not really contending anything. I'm just reporting on my  
13 findings and saying it seems clear from the findings that the  
14 enacted plan, for each of these three enacted plans was not  
15 drawn under a process like my computer simulation process,  
16 that was in fact prioritizing the minimization of county  
17 breaks. It's a statistical outlier in that nature.  
18 I don't really read anything into it more than  
19 that, which is to say that it clearly was not trying to  
20 prioritize -- prioritize the minimization of county breaks  
21 because there is clearly a difference between that and the  
22 sort of computer-simulated plans that emerged.  
23 Q. Okay. And I think you've clarified then that when you say  
24 that the plan was driven by partisan intent, that inference  
25 is based on the fact of the statistical difference between

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1 accurately as I can.  
2 It may have been that -- it may have been that  
3 Plaintiffs may have mentioned something very general about  
4 alternative plans that were proposed, but I certainly don't  
5 remember myself going and analyzing any such alternative  
6 plans.  
7 Q. Okay. Have you analyzed -- assume with me that the map  
8 drawers for the enacted plan thought that their plan had the  
9 fewest number of county breaks, relative to all alternatives.  
10 And that your computer algorithm came up with a different  
11 way, a better way to minimize county breaks. Would you think  
12 that that in any way reflects on the intent underlying the  
13 legislature's plan?  
14 MR. YEAGER: Objection, calls for speculation and  
15 incomplete hypothetical.  
16 You may answer.  
17 THE WITNESS: Okay. In general I'm not an expert  
18 on opining that sort of -- that sort of question because  
19 obviously I don't have firsthand knowledge of what was on the  
20 legislator's mind. I can't really go further than to give  
21 you the general statistical conclusions that I've given you  
22 obviously in my report here.  
23 I would probably -- at the very least I would need  
24 a lot more information.  
25 I think you posed it as compared to the other

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1 alternative plans that the legislature was considering, the  
2 enacted plan had the fewest number of county breaks, and  
3 obviously that's a big unknown there. What were the  
4 alternative plans? Was there just one alternative or were  
5 there a hundred? And were those alternative plans drawn with  
6 an effort towards minimizing the number of county breaks?  
7 At a very minimum I'd need to know some answers to  
8 those sorts of questions before I could really --  
9 BY MR. CARVIN:  
10 Q. So you're really not opining on the partisan intent behind  
11 these plans because you haven't examined these relevant  
12 issues, right?  
13 A. Well that's not what I just said.  
14 I am opining about the partisanship of the enacted  
15 plan; but the basis, as I've said, the basis of my opining on  
16 it is simply comparing it to these computer-simulated plans.  
17 Obviously I've not gotten into the heads of the legislators,  
18 figured out what they were considering or any alternatives  
19 they were considering.  
20 Q. So you're not opining on their intent, you're simply opining  
21 on the results as compared to your simulated plans, right?  
22 A. Well if you mean intent as in have firsthand knowledge of  
23 what was in their minds, certainly I'm not.  
24 I am opining to their partisan intent insofar as  
25 I'm able to say this is the sort of enacted plan -- this

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1 right?  
2 A. I'm not sure it was totally six years, but something in that  
3 rough -- obviously several years. I get your point.  
4 Q. Let me ask you a hypothetical. In an employment context, the  
5 employer hires a white person. Five years later, a clearly  
6 objectively better-qualified black person applies for the  
7 job. Would you infer that the failure to select the  
8 objectively better-qualified black person reflects racial  
9 intent?  
10 A. I mean obviously it's just going to be beyond my expertise to  
11 tell you anything about racial intent in employment.  
12 I understand your general point which is that that  
13 second candidate was not available at the time of the  
14 original hiring, I get where you're going.  
15 But obviously I'm going to have to answer that it's  
16 beyond my expertise to tell you anything about racial intent  
17 and employment.  
18 Q. Okay. So as far as you know your entire analysis of partisan  
19 intent is directly analogous to somebody arguing racial  
20 intent based on not selecting a better-qualified black  
21 applicant who applied five years after the decision was made?  
22 MR. YEAGER: Objection, misstates the testimony.  
23 You may answer.  
24 BY MR. CARVIN:  
25 Q. You're not trying to distinguish my hypothetical from the

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1 enacted plan is the sort of plan that has a partisanship that  
2 could not be explained or could not have reasonably been  
3 expected to emerge from this sort of simulated districting  
4 process that prioritizes these things.  
5 That's the basis of me saying it seems like there  
6 was some kind of partisanship here.  
7 Q. Right.  
8 A. So I mean whether you want to call that partisan intent or  
9 not --  
10 Q. That's your phrase.  
11 A. Sure. I mean I call it partisan intent because I'm  
12 comparing --  
13 Q. Right.  
14 A. -- the sort of enacted plan that emerges from another process  
15 that I am designing to be ignorant of partisanship.  
16 Q. Right.  
17 A. So I call it partisan intent.  
18 I sort of understand that you're sort of meaning  
19 something a little bit different when you're asking me about  
20 legislators considering alternative plans. And to the extent  
21 that that's a different concept, obviously I'm telling you  
22 that I have no firsthand knowledge of anything the  
23 legislature -- the legislature was considering.  
24 Q. And your algorithm in all these plans were developed, what,  
25 six, seven years after they had already voted on the plan,

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1 analysis used in your report, right?  
2 MR. YEAGER: Same objection.  
3 You may answer.  
4 THE WITNESS: I'm not agreeing with that at all,  
5 obviously. I simply said that I understand what you're  
6 trying to say with that analogy.  
7 I certainly didn't opine at all, and I'm not -- I'm  
8 not opining that I think your analogy is completely the same  
9 or really --  
10 BY MR. CARVIN:  
11 Q. Well you are.  
12 MR. YEAGER: Let him finish.  
13 BY MR. CARVIN:  
14 Q. Okay.  
15 A. All I really meant to say was that obviously I'm not agreeing  
16 with your statement that those two are perfectly analogous.  
17 Q. Let me make it more general. You are opining on the partisan  
18 intent of the enacted plan; when you're analyzing intent,  
19 partisan, racial or any others, the only relevant comparison  
20 is between the alternatives available to the decisionmaker at  
21 the time, right?  
22 A. No. I mean obviously that's not the way I'm analyzing  
23 partisanship here.  
24 Q. I know. Can you give me an example of where you're trying to  
25 discern intent, you use an example that was not available to

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1 the decisionmaker to infer a negative intent? We always  
2 analyze it in terms of the alternatives reasonably available  
3 to the decisionmaker at the time the decision was made, don't  
4 we?  
5 **A. I'm not qualified to answer that question.**  
6 Q. Okay. So if that is true, then whatever evidence is produced  
7 by your plans that were created five years later, doesn't  
8 shed any light on intent, correct?  
9 MR. YEAGER: Objection, incomplete hypothetical,  
10 misstates the record.  
11 You can answer.  
12 THE WITNESS: I'm obviously not agreeing with that.  
13 BY MR. CARVIN:  
14 Q. But you're not disagreeing, are you?  
15 **A. Well my answer to your previous question was that I'm just**  
16 **not qualified to give you an analogy in another context**  
17 **outside of my academic work, or my academic expertise here**  
18 **with how I evaluate enacted and simulated districting plans.**  
19 You asked me if I could give you an analogy, I said  
20 I'm not qualified to do that. But I'm not really concluding  
21 or giving an opinion drawing from that in any other way.  
22 Q. Your methodology in creating these simulated plans, is this  
23 something you -- well how would you characterize the  
24 methodology, I guess? What are you trying to accomplish  
25 here? Is there any commercial or other analogs to what

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1 you're doing?  
2 **A. Are there commercial analogs to redistricting algorithms?**  
3 **That was the question, right?**  
4 Q. Yes.  
5 **A. There is nothing quite literally the same, but the general**  
6 **principle of drawing geographic boundaries using a computer**  
7 **algorithm is certainly, I think, pretty widespread. It's**  
8 **commonly used in the commercial world.**  
9 I could probably give you a couple of very rough  
10 examples off the top of my head if you'd like.  
11 Q. Sure.  
12 **A. I'll give some very general examples.**  
13 Imagine if you are Fed Ex and you want to develop  
14 -- or UPS, really any shipping company, and you want to  
15 develop delivery zones. You deliver packages in, say, New  
16 York City. And obviously you're not going to have just one  
17 driver working for you in New York City, you're going to have  
18 hundreds of drivers. You have to develop delivery zones.  
19 You have to draw, in other words, maps that optimize on  
20 something.  
21 Now obviously those optimization criteria are not  
22 the sort of redistricting criteria that we've been talking  
23 about here today. Those optimization criteria are probably  
24 something like what sort of delivery zones would allocate  
25 drivers in the most efficient way so that each of the hundred

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1 drivers employed by Fed Ex in New York City has roughly the  
2 same number of packages to deliver, roughly the same miles  
3 that they have to drive, something like that.  
4 I mean obviously I'm not characterizing it exactly  
5 in a precise way, but you get the idea.  
6 So Fed Ex has to draw delivery zone maps. How do  
7 they do that? They wouldn't just have a human go in and draw  
8 what looks to be a good idea. They actually really, really  
9 try to optimize those maps to try to save on things like fuel  
10 efficiency, reduce the number of say left-hand turns that  
11 drivers have to make throughout the day, all kinds of  
12 logistical things. Make it so that the driver can park  
13 safely while they're delivering packages, that sort of  
14 considerations.  
15 And what a programmer in that kind of context is  
16 trying to do is optimize a map by building in criteria.  
17 There is probably not one perfect map, but certainly with  
18 those criteria, some maps are definitely better than others  
19 at achieving those criteria.  
20 So that's the general idea. I mean that's just one  
21 random example of an industry application that's probably  
22 pretty widely used.  
23 Q. Outside of your algorithms for redistricting, have you ever  
24 taught or written about this optimization method?  
25 **A. Have I ever taught or written about it? Sure. I write about**

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1 it quite a bit in my academic work.  
2 Q. Outside of the redistricting context?  
3 **A. Well my academic work is outside of the redistricting**  
4 **context. The point is --**  
5 Q. I know you wrote three articles that talk about the kind of  
6 analysis --  
7 **A. Or you're asking --**  
8 Q. I'm saying more generally in terms -- go ahead.  
9 **A. I think you're trying to ask if I use algorithms that**  
10 **optimize something, but not redistricting.**  
11 Q. Right.  
12 **A. Not redistricting criteria.**  
13 No. I mean it's my academic -- it's really one of  
14 my core academic areas. I specialize in writing about  
15 legislative districting, political geography. So this is  
16 basically what I focus on.  
17 Q. But the optimization method itself is not something in,  
18 anything that you've taught or opined on the correct way to  
19 create samples, create random sort of samples?  
20 **A. That is what I write about in my redistricting papers. And I**  
21 **think you're asking do I do any of that same sort of stuff in**  
22 **any area of study outside of redistricting. I think that was**  
23 **your question.**  
24 And again, the answer is no. I primarily write --  
25 these days I primarily write about legislative districts and

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1 about political geography.  
2 Q. And you've never been hired as a consultant outside of this  
3 context on optimization methods more generally?  
4 A. On optimization methods?  
5 Q. The kind of thing you described with the Fed Ex, for example.  
6 A. Oh, yeah, I'm not a consultant for Fed Ex or any entity like  
7 that.  
8 Q. Okay.  
9 A. If I were, I probably couldn't have given you that example.  
10 Q. Right. So you've presented a number of analyses in your  
11 report here of districts, particularly in the past elections,  
12 right? The 2006 through 2010 statewide elections, and the  
13 2012 through 2016 elections.  
14 My question is are you doing any analysis or making  
15 any forecasts about results that will reasonably occur in  
16 2018 or 2020 relative to the three offices at issue in this  
17 case?  
18 A. I did not make any forecasts regarding specifically what I  
19 expect to happen in 2018 or 2020, beyond generally just  
20 analyzing the enacted districts.  
21 Q. Right. But you're not making any predictions in terms of the  
22 number of Republican congressman, Republican state  
23 legislators that are going to be elected in 2018?  
24 A. Not beyond just generally analyzing the partisan of the  
25 districts. So I think I'm generally not trying to say, for

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1 analyses are of the elections that have already occurred. My  
2 question is are you inferring from what has occurred in the  
3 past any predictions or statements to a reasonable degree of  
4 professional certainty about what will occur in the 2018  
5 elections under these redistricting plans?  
6 MR. YEAGER: Asked and answered.  
7 You may answer.  
8 THE WITNESS: Like I said, all I'm doing is  
9 characterizing the general partisan performance of those  
10 districts. That characterization is generally going to be  
11 valid as -- if the districting plan continues to be in place.  
12 BY MR. CARVIN:  
13 Q. So you are -- what do you mean by likely to be valid? You're  
14 saying that the numbers produced in 2018 will be very similar  
15 to, identical to the numbers in your report?  
16 MR. YEAGER: Asked and answered.  
17 You may answer.  
18 THE WITNESS: No. I certainly am not predicting  
19 that because -- I'll just throw out a random example. I  
20 calculated that in the enacted Congressional plan, using  
21 recent past statewide election results, you can see that nine  
22 districts favor Republicans and five favor Democrats. It's  
23 not saying that I'm specifically guarantying or predicting  
24 that there will be exactly nine districts going for  
25 Republicans in 2018.

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1 example, that somehow I think that in November 2018, the  
2 Republican party will win three more House seats than it has  
3 in the previous election, nothing like that where I'm making  
4 a new prediction relative to past partisan performance,  
5 nothing specific to 2018.  
6 Q. But even generally, you're not making any prediction about  
7 whether or not Democrats will achieve at least proportional  
8 representation in the Congressional delegation, Senate  
9 delegation and House delegation in 2018 or 2020, right?  
10 A. Okay. That's a little bit of a different question. I  
11 definitely am not analyzing whether either party will achieve  
12 proportional representation in any election really.  
13 Q. All right. And you're not making any predictions about  
14 whether Democrats will achieve any level of representation in  
15 the 2018 or 2020 elections with respect to the three offices  
16 at issue?  
17 A. Again, only insofar as I've generally analyzed and reported  
18 on the partisanship of the enacted districting plans.  
19 Q. Right.  
20 A. So I've generally characterized the partisanship of those  
21 plans and obviously that is a characterization that could  
22 apply in an election like 2018 or 2020. But it's not a  
23 characterization that is specific to 2018, as opposed to  
24 2016, as opposed to 2014.  
25 Q. Well all your other things are backward looking, all the

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1 It's a general characterization of the partisanship  
2 of that districting plan which, if that districting plan is  
3 still in place in November 2018, then it's still an accurate  
4 characterization of that districting plan for the purpose of  
5 2018, as it was for 2016, as it was for all earlier years.  
6 It's just a characterization. I'm not saying, for  
7 example, that I think there is going to be a two percent  
8 Republican tide in 2018 relative to 2016. That would be I  
9 think what an election specific prediction does.  
10 BY MR. CARVIN:  
11 Q. I don't want to focus on the word specific. Are you opining  
12 on the likelihood of electing seven Democrats in the  
13 Congressional delegation in 2018 based on all the numbers in  
14 your report?  
15 A. Only insofar as in general, what I am opining on is that, for  
16 example, the enacted Congressional plan is a nine-five plan,  
17 meaning that what my opinion is is that the long-run average  
18 is going to be, over any number of elections, is going to be  
19 that an expectation that the Republicans will win nine  
20 districts out of 14 in the Congressional plan.  
21 Now I'm not characterizing that as a 2018 specific  
22 prediction, but obviously you can see how that prediction  
23 could cover the 2018 election year. I just want to make that  
24 distinction.  
25 Q. I'll ask you again. What percentage likelihood is there of

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1 electing seven Democrats in 2018 or 2020 based on your  
2 analysis in this report? Are you opining on that?  
3 MR. YEAGER: Asked and answered.  
4 You can answer.  
5 THE WITNESS: I'm not arriving at a prediction to  
6 say there is X percent probability that the Republicans will  
7 win seven, Y percent probability that the Republicans will  
8 win eight, nothing like that.  
9 As I said, I'm characterizing the partisanship  
10 which I take to mean -- to say that in the long-run  
11 expectations Republicans are going to win in the enacted  
12 Congressional plan nine seats and Democrats will win five.  
13 BY MR. CARVIN:  
14 Q. The long-run expectation in this case is the 2020 elections,  
15 you understand that, right?  
16 A. Well I'm trying to analyze really all elections for a number  
17 of years.  
18 And I understand that some of those are in the  
19 past, and I appreciate your making this distinction that we  
20 only have 2018 and 2020 ahead of us.  
21 Q. Okay. But you don't think that this litigation is going to  
22 affect the 2018 elections, do you?  
23 A. That's completely outside of my expertise.  
24 Q. Do you have a calendar? You don't really --  
25 A. All right. I'll grant you that we're pretty darn close to

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1 results through a uniform swing analysis. Do I have that  
2 straight?  
3 A. Yes.  
4 Q. And your uniform swing analysis was based on actual  
5 Congressional elections or House elections or Senate  
6 elections that occurred in the last six years, right?  
7 A. In '12, '14 and '16, yes, so I guess that's -- well I get  
8 what you're saying.  
9 Q. You didn't base your uniform swing analysis on the numbers  
10 produced by your collection of statewide races from 2006 to  
11 2010 and 2012 to 2016, right? You based it on the real world  
12 endogenous elections?  
13 A. I did not apply uniform swing to the statewide election  
14 measure.  
15 Q. Right. You applied it to real world endogenous elections,  
16 right?  
17 A. I'll just state the real world legislative elections. I'm  
18 not going to guess what you mean by the term endogenous, but  
19 I think we're obviously, we're talking about the actual  
20 legislative elections that actually occurred in '12, '14 and  
21 '16.  
22 Q. Okay. Just to be clear and maybe save some time, when I say  
23 endogenous I mean elections for the office at issue as  
24 opposed to exogenous elections for governor, etcetera.  
25 A. Sure, I got you.

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1 November. I'll go out of my way to agree with you on that.  
2 Q. All right. So all we're talking about 2020, that's the only  
3 significance here.  
4 I'll ask you again, do you have any general  
5 analysis of the likelihood of electing seven Democrats under  
6 the enacted plan in 2020?  
7 A. Same answer as before. What my numbers are saying is that in  
8 general we expect the enacted Congressional plan, as an  
9 example, to be a nine-five plan. That's a general  
10 expectation, and sure, you can apply it to the 2020. And  
11 that's how I intend for it to be used.  
12 Obviously, as I said before, I'm not specifically  
13 giving you a predicted probability that the Republicans would  
14 win seven as opposed to six as opposed to eight, nothing like  
15 that.  
16 Q. And you're not going to give me a predicted probability that  
17 Republicans are going to win nine, right?  
18 A. I'm not giving you a predicted probability. All I'm telling  
19 you is that in general there are nine Republican districts.  
20 Q. As you defined it. Okay.  
21 Let me ask you about how you do define them. If  
22 you could turn to page 52 of your report, please?  
23 A. Okay.  
24 Q. And essentially what you're describing on these pages is you  
25 analyzed the durability of the enacted plan's partisan

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1 Q. All right. And why did you do that?  
2 A. Why did I analyze the uniform swing here with respect to the  
3 so-called endogenous elections?  
4 Q. Right.  
5 A. Well I wanted to analyze the partisan durability of the  
6 various enacted plans that I was analyzing.  
7 Q. But when you were comparing the partisan results of the  
8 enacted plan through 2016, you didn't use the real world  
9 endogenous election results, you used this collection of  
10 statewide races from 2006 -- 2012 through 2016?  
11 A. Correct. And obviously '06 to 2010 as well.  
12 Q. Right. Why would you use a different set of elections to  
13 analyze the durability of a partisan gerrymander going  
14 forward, than from whether, analyzing whether or not it was a  
15 partisan gerrymander through 2016?  
16 A. Well it's two different questions. So I'll speak to the  
17 durability here and I'm happy to go back to the simulation  
18 analysis.  
19 But it's two different questions here. What we're  
20 asking when I'm trying to analyze partisan durability is to  
21 say, let's suppose you applied a shock, an exogenous shock.  
22 What sort of swing would it take to, say for example, flip  
23 around the partisan control or even out the partisan control.  
24 It's just a completely different kind of question  
25 based on actual partisan elections here in the recent past.

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1 I'm not -- with what I'm doing here, I'm not just  
2 trying to characterize -- characterize, say, the enacted  
3 plans in terms of their overall partisanship so that I can  
4 directly compare it to the simulated plans. When I'm looking  
5 at durability here I'm not doing a direct comparison to the  
6 simulated plans.  
7 So we don't need to get out of the, out of the  
8 realm of the individual districts and come up with a measure  
9 of partisanship that can apply to alternative districts.  
10 That's off the table here.  
11 What I'm doing with durability is nothing but  
12 looking at the actual districting plans. So I'm able to use  
13 the so-called endogenous elections because I don't have this  
14 sort of issue of trying to come up with an apples-to-apples  
15 comparison to simulated districting plans.  
16 Q. Right.  
17 A. So it's just two completely different sorts of analyses.  
18 Q. But if you were, wholly apart from the simulated plans,  
19 trying to assess the partisan results of the enacted plan,  
20 you would use endogenous elections. The reason you're using  
21 exogenous elections is because you need to compare the plan  
22 to these thousand simulated plans. Do I have that right?  
23 A. I will agree to qualify that's one of the reasons. There are  
24 other reasons as well, but that is certainly one of the  
25 reasons.

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1 Q. Okay. If you were just trying to figure out the partisan  
2 effect of a redistricting plan, which is better, endogenous  
3 or exogenous elections?  
4 THE WITNESS: If I could ask you to read that back.  
5 (Record read: Q. If you were just trying to  
6 figure out the partisan effect of a redistricting plan,  
7 which is better, endogenous or exogenous elections?)  
8 THE WITNESS: The answer is it will depend on what  
9 you mean by partisan effect.  
10 What I'm trying to answer, which obviously I do in  
11 my report, is what is the partisan difference --  
12 BY MR. CARVIN:  
13 Q. Right.  
14 A. -- between an enacted plan --  
15 Q. I apologize for interrupting, I really do, but I want to  
16 clarify my prior question.  
17 A. Okay.  
18 Q. You're making a very helpful distinction between the partisan  
19 difference between an enacted plan and the simulated plans.  
20 Now I'm asking you to say you're not examining that  
21 question, the partisan differences, you're just simply trying  
22 to figure out the partisan effect of the enacted plan in and  
23 of itself.  
24 In that circumstance, endogenous elections are more  
25 probative than exogenous elections, is that right?

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1 A. No, I wouldn't necessarily say so. Again, it's going to be  
2 context dependent. And there are some various reasons for  
3 that and I'm happy to start listing out some of those  
4 reasons.  
5 But as a general principle, there is no one  
6 election that is always going to be the perfect measure. And  
7 in general the reason I use statewide elections when I'm  
8 measuring the partisanship of enacted plans and along with  
9 the simulated plans, is because using more elections is more  
10 helpful, more stable and gives us a more accurate indicator  
11 of the long-run partisanship of a district.  
12 Q. What about -- I'm sorry.  
13 A. But to get back to using the endogenous elections, it could  
14 be. But it might not be. It's really context dependent.  
15 It could be that the endogenous elections are  
16 really skewed by, say, biases that were present because of  
17 the incumbents that were already in place elected from the  
18 previous decade's plans. Those things could skew the mere  
19 use of endogenous elections in evaluating the current  
20 decade's plan.  
21 The point is just that nothing is perfect, and it's  
22 context dependent.  
23 Q. What is a better predictor of the results -- the results in  
24 the Congressional elections of 2018 and 2020, the results in  
25 the Congressional races for 2012 through 2016, or exogenous

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1 elections for other offices during that time period?  
2 A. Which is better for the purpose of predicting 2018 to 2020  
3 results? It really depends. It could be the case that  
4 endogenous elections are a more accurate predictor, but  
5 that's not necessarily the case.  
6 It's context dependent because using endogenous  
7 elections brings in inevitably a large number of factors that  
8 are not necessarily always going to be present in those same  
9 districts.  
10 So if there are drastic shifts in say a partisan  
11 tide that was present in 2016 that's not present in 2018,  
12 that could affect things. If there were campaign finance  
13 differences, if there were incumbency differences, all those  
14 factors could mean that using statewide elections is actually  
15 a better predictor.  
16 Q. Have you ever written an article on what is a better  
17 predictor for the last -- for future elections, the results  
18 in prior endogenous elections in the same districts or  
19 exogenous results?  
20 A. Let me make sure I understand the question. Have I ever  
21 written an article in which I'm specifically comparing  
22 statewide elections versus endogenous elections?  
23 Q. Sure.  
24 A. That's the question?  
25 Q. Yes.



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1 A. Let me think. I can't recall an article where that was the  
2 specific focus of the article was to compare these two  
3 methods and to say one is better in these cases or the other  
4 is better.  
5 Q. Can you cite me an article that contends that exogenous  
6 elections are better predictors of future results in those  
7 offices than exogenous elections?  
8 A. Can I cite any academic article that has tried to show using  
9 exogenous elections is superior?  
10 Q. Yes.  
11 A. I'm going to try off the top of my head. I'm generally aware  
12 that that's been the subject of some study in the literature,  
13 and there is a paper by Simon Jackman, and I believe two  
14 co-authors that gets at that question. And they settle upon  
15 using some kind of statewide election. I believe they settle  
16 upon using something like a presidential election based  
17 method of predicting Congressional election outcomes.  
18 And I think it's limited to just Congressional, not  
19 state legislative predictions.  
20 It was Jackman and two other authors, I can't  
21 remember off the top of my head right now. I think one of  
22 them was Josh Clinton, but I'm kind of blanking on who the  
23 last one was.  
24 So I'm generally aware of that kind of literature.  
25 Q. Okay. If you could turn to page six of your report?

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1 A. What page?  
2 Q. Six. I'd like to direct your attention to the first --  
3 second full sentence. You say, statewide elections are thus  
4 a better basis for comparison than the results of legislative  
5 elections such as U.S. House and state legislative elections,  
6 because the particular outcome of any legislative election  
7 may deviate from the long-term partisan voting trends of the  
8 constituency, due to factors idiosyncratic to the legislative  
9 district as currently constructed. Right?  
10 So you think that the outcome of legislative  
11 elections at issue in this litigation may deviate from the  
12 long-term partisan voting trends that are reflected in the  
13 statewide elections, correct?  
14 A. Like I said earlier, that's always a factor. Or there are  
15 always many such factors when we're looking at legislative  
16 election races.  
17 And just as a very general principle, like I'm  
18 stating here, when we look at a large number of statewide  
19 elections, and very often there is more than one statewide  
20 election in a particular election year, we get greater  
21 stability in our understanding of the partisanship of a  
22 particular district.  
23 Q. Right. And you list legislative specific factors that affect  
24 outcomes in the real world, right? The presence or absence  
25 of a quality challenger, anomalous differences between the

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1 candidates and campaign efforts, or campaign finances, and  
2 incumbency advantage. Those are the kinds of factors that  
3 affect election outcomes in the real world, right?  
4 A. Yes, that's what I said here.  
5 Q. And your analysis of the statewide election doesn't pay any  
6 attention to those real world factors that affect elections  
7 in the real world, right?  
8 A. No. That's not true at all. Obviously these factors, at  
9 least some of these factors, are present in any set of  
10 statewide election results, or at least they can be present.  
11 Q. All right. Let's take them one at a time. You're saying  
12 that incumbency advantage is factored into the results for  
13 the university and board of trustees in the districts you're  
14 analyzing?  
15 A. I'm not specifically saying that about the university board  
16 elections.  
17 Q. All right. Any of the statewide elections don't factor in  
18 the House, Senate or Congressional incumbent in their  
19 election results?  
20 A. Oh, okay, I get what you're going. You're going to something  
21 a little bit different than what I was thinking about.  
22 So all I really meant with my previous statement  
23 there was that as a very obvious matter, in a race for the  
24 U.S. Senate or the state governor, the incumbency of the  
25 current officeholder of that office, obviously can be a

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1 factor. And I'm just admitting that, sure, some of these  
2 factors are present too in statewide elections.  
3 I obviously didn't mean to imply that what you were  
4 kind of getting at which is that somehow the State Senator  
5 being an incumbent from State Senate -- State Senate District  
6 number five would affect the Michigan gubernatorial race, or  
7 how much it would affect.  
8 Obviously what I'm talking about is the incumbency  
9 of the officeholder in those statewide elections.  
10 Q. Right.  
11 A. And obviously I'm saying that things like campaign finance  
12 can certainly affect statewide elections.  
13 Q. Yes, I know. But when you're analyzing legislative elections  
14 on the basis of statewide elections, you will not look at  
15 either the incumbent in the district, how well financed he is  
16 or the quality of his challenger, none of that will be  
17 factored in? All of those factors will be factored in if you  
18 looked at prior elections for the office in the real world  
19 district, right?  
20 A. And just to clarify, you're now going back to my statewide  
21 measure analysis of the enacted and the simulated plans --  
22 Q. Correct.  
23 A. -- when you're asking that. Okay. I get where you're going  
24 now. Obviously I acknowledge that's true.  
25 All I'm doing here is adding up the number of

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1 Republican and Democratic votes in those statewide elections.  
2 I'm not, say, adding a two point boost for a really good  
3 campaign fundraiser or something like that.  
4 Q. Nor are you looking at the elections in those districts which  
5 included factors such as incumbency, campaign finance and the  
6 like?  
7 A. I simply just measured the partisanship with respect to those  
8 statewide elections.  
9 Q. Okay. In North Carolina, in addition to the analysis based  
10 on statewide races, you analyzed the simulated plans based on  
11 vote shares generated by a regression model that controlled  
12 for incumbency and turnout, did you not?  
13 A. Yes, that's correct.  
14 Q. And incumbency and turnout will effect elections in the real  
15 world?  
16 A. Well I can characterize my findings in North Carolina, which  
17 was that obviously I produced a regression model --  
18 Q. I'm not asking about that.  
19 A. Okay.  
20 Q. I'm asking, does incumbency affect elections in the real  
21 world?  
22 A. Okay. You're just asking as a very general question.  
23 Q. Yes.  
24 A. And my answer is in general we know it does, obviously there  
25 is variation in when it does. But in general.

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1 Q. And turnout affects elections in the real world?  
2 A. Does incumbency affect turnout?  
3 Q. No, does turnout affect election results?  
4 A. Oh, sure. I mean obviously the relative turn out of  
5 Democrats and Republicans in any particular election is  
6 obviously going to have influence on who wins.  
7 Q. And you didn't do any similar analysis in this case like you  
8 did in North Carolina, is that true?  
9 A. Oh, that's not true at all. I mean if you'd like to ask me  
10 about something specific --  
11 Q. Maybe I misunderstood. You did --  
12 A. I think you were trying to ask specifically about the  
13 regression model.  
14 Q. Yes, did you do a regression model like the one I described  
15 in North Carolina in this case?  
16 A. I got you. And the answer to that question is here I did not  
17 do that sort of regression model, I just counted on the  
18 statewide election votes.  
19 Q. Okay. And then if you turn to page ten of your report?  
20 Well, you breakdown these components into 2012 -- 2002 to  
21 2016, and 2006 to 2010, right? You present them both ways?  
22 A. 2006 to 2010 then '12 to '16.  
23 Q. Yes. And which is more probative of those two, if either?  
24 A. That's not a question that I directly tried to pit one  
25 against the other, and tried to adjudicate between the two.

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1 In general they're both indicative of the  
2 underlying partisanship of the districts.  
3 Q. But you haven't made any analysis or determination as to  
4 which of the two sets is more probative of the partisan  
5 constituency of the plan?  
6 A. No. Other than to generally see that they are both pretty  
7 highly correlated with the overall partisan performance of  
8 the districts during this decade.  
9 I didn't, say, calculate whether one produced a  
10 slightly higher correlation than the other, other than to  
11 generally figure out that they were in fact -- they seemed to  
12 be strongly correlated.  
13 Q. Okay. You say that using recent past statewide elections has  
14 been an extremely accurate predictor of actual legislative  
15 outcomes in the enacted plan. Correct?  
16 A. Maybe you could just help orient me.  
17 Q. I'm sorry, the second paragraph. I find that overall, using  
18 past statewide elections has been an extremely accurate  
19 predictor of actual legislative election outcomes in the  
20 enacted plan's districts?  
21 A. Yes, I see that sentence.  
22 Q. Okay. And then you go on and you say that it's been accurate  
23 in Congress because the statewide elections predict nine  
24 Republican seats, and that's what happened in the real world.  
25 Right?

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1 So you got the number -- the statewide elections  
2 predict the number of Republican seats in the Congressional  
3 elections, right?  
4 MR. YEAGER: Objection, incompletely states the  
5 document.  
6 You may answer.  
7 THE WITNESS: What I'm reporting here is that there  
8 are nine districts that, using the statewide elections, are  
9 favoring Republicans over Democrats in both the 2006 and  
10 2010, as well as the '12 to '16 statewide elections. And I  
11 can see that obviously those nine districts are the same ones  
12 that have been electing Republicans.  
13 BY MR. CARVIN:  
14 Q. And you would count a Republican district as anything that's  
15 a 50.1 percent district under the statewide, correct?  
16 A. That's correct. I'm simply characterizing them as having  
17 more Republican votes or more Democratic votes as a share of  
18 the total summed up aggregated two-party votes across all  
19 those statewide elections.  
20 Q. So you would equate a 51 percent Republican district as a  
21 Republican district, as well as a 65 percent Republican  
22 district?  
23 A. I wasn't really equating them other than saying I'm  
24 characterizing them as Republicans.  
25 Q. Right.

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1 **A. So I guess you could say they were given characterizations**  
2 **that were the same.**  
3 Q. What I'm trying to figure out is did you ever look at how  
4 close the real world percentages were to the statewide  
5 percentages in the individual districts?  
6 **A. Okay. I see, you're asking if I ever took the difference**  
7 **between the results in the endogenous election, and the**  
8 **aggregated partisan vote share in the exogenous statewide**  
9 **elections.**  
10 **To my recollection, I can't specifically remember**  
11 **doing that here in this report. I certainly don't recall**  
12 **reporting such numbers here in this report.**  
13 **It's something I've generally studied as a**  
14 **political scientist in my academic work.**  
15 Q. But you didn't do it here?  
16 **A. I don't recall specifically reporting it here.**  
17 Q. It's not in your report?  
18 **A. I don't recall it being in my report.**  
19 Q. Okay. And even with respect to whether or not the same  
20 results occur in terms of whether a seat is Republican or  
21 Democratic, with respect to the House, if you'll go to the  
22 last paragraph, you predict in your amalgam of races that the  
23 State House elections would be 61 Republicans, right?  
24 **A. I'm basically just counting up and reporting that, yeah, it's**  
25 **61 districts that have more Republican than Democratic votes**

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1 **during the '6 to '10 and the '12 to '16 elections.**  
2 Q. And that's under both the 2006 to 2010 elections and the 2012  
3 to 2016 elections, right?  
4 **A. I see that right there, yes.**  
5 Q. And in the real world there has never been 61 Republicans in  
6 the House in 2012, 2014 and 2016?  
7 **A. I can see here in the next sentence that it's basically right**  
8 **around 61, it's 59, 63 and 63. In other words all clustered**  
9 **right around 61.**  
10 Q. Right.  
11 **A. Obviously never exactly 61, not one more or one less.**  
12 Q. And every year you were off by at least two seats when you  
13 compared the statewide election results that you came up with  
14 and the real world elections for the House, right?  
15 **A. Yeah. I guess you could say 59 is two below and then 63 is**  
16 **two above.**  
17 Q. And you consider that an extremely accurate predictor, being  
18 within two House seats? You think that's an extremely  
19 accurate predictor?  
20 **A. Well in general when we're predicting, say, state legislative**  
21 **districts, from my experience having used similar sorts of**  
22 **statewide elections in other states to predict legislative**  
23 **elections, this sort of accuracy is about what we expect.**  
24 **I mean obviously the point is that not every**  
25 **single -- we would never expect -- it would be shocking to**

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1 **see if over the course of a decade every single State House**  
2 **race produced exactly 61 or 55 districts favoring Republicans**  
3 **with never a deviation. One would start to probably question**  
4 **the legitimacy of election results if they were that**  
5 **predictable.**  
6 **But the point is that we expect in general to have**  
7 **around 61 out of 110 districts favoring Republicans. And**  
8 **from the '12, '14 and '16 results that's basically what we**  
9 **see. They're all clustered right around 61 out of 110.**  
10 Q. So you don't expect -- or you do expect to be off by say two  
11 seats based on your statewide analysis in terms of predicting  
12 election results?  
13 **A. I wouldn't say it's in general we expect to be wrong by**  
14 **exactly two seats.**  
15 Q. In other words, it wouldn't surprise you?  
16 **A. Well, it depends. In general we obviously know that**  
17 **statewide legislative election results ebb and flow along**  
18 **with whatever partisan tides are going on at the time.**  
19 **So if in 2016 the Republicans have an especially**  
20 **good year, we expect that number to be a little bit above 61.**  
21 **In 2012 when you've got President Obama on the ballots and**  
22 **the Democrats have a relatively good year, we expect that**  
23 **number to be a little bit below 61. In an even year you**  
24 **might expect it to be closer to the expectation.**  
25 **But the point is that we expect there to be some**

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1 **kind of fluctuation naturally because obviously partisan**  
2 **tides, and obviously other idiosyncratic factors are**  
3 **something that's a constant in these sort of elections.**  
4 Q. What would you expect in 2018 in the Congressional elections?  
5 **A. Oh, I'm not the sort of forecaster --**  
6 Q. But you're a political scientist --  
7 **A. But I'm not --**  
8 MR. YEAGER: Wait, wait. We're going to have  
9 questions, and we're going to have answers.  
10 Professor, let's wait until he asks a question.  
11 Please ask a question.  
12 THE WITNESS: I get --  
13 MR. YEAGER: Wait until he asks a question.  
14 THE WITNESS: Okay.  
15 MR. YEAGER: Is there a question on the table?  
16 BY MR. CARVIN:  
17 Q. Historically how does the president's party do in the  
18 following off-year elections in Congress, better or worse  
19 than prior elections?  
20 **A. If I could ask, in the following off-year?**  
21 Q. Yes.  
22 **A. Oh, in the second year of the president's term?**  
23 Q. Yes.  
24 **A. I'm going to start by qualifying this is not the sort of**  
25 **thing I study. I don't study political election history, I**

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1 don't study historical election results.  
2 It is sometimes certainly the case that the  
3 president, that the president's party doesn't do as well in  
4 the second term -- I'm sorry, in the second year of the  
5 president's first term. But that's not always an absolute.  
6 That's a very, very general pattern with lots of exceptions.  
7 And more broadly the point is that I'm not an  
8 expert in election forecasting. I'm not the sort of  
9 political scientist who tells you that I think that Trump's  
10 approval rating is going to translate to a particular  
11 performance by Republican or Democratic candidates this  
12 November. That's just not the sort of expertise I have or  
13 do.  
14 Q. You're not an expert in what will happen in upcoming  
15 elections?  
16 A. Well again that's not quite accurate. The point is that  
17 election forecasters make specific predictions about specific  
18 upcoming elections using things like polling data, surveys.  
19 I'm able to still characterize the general  
20 partisanship of a district or a state jurisdiction, and say  
21 over the long term here is what we expect the partisan  
22 performance of that district to be.  
23 But I'm not the sort of election forecaster who is  
24 able to look at a bunch of polls and somehow define these  
25 poll numbers are going to translate into really good news for

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1 BY MR. CARVIN:  
2 Q. Again, I think we left off when we were at page ten of your  
3 report.  
4 A. Okay.  
5 Q. And under both your 2006 to 2010 and your 2012 to 2016  
6 statewide elections, you assessed that there would be 24 of  
7 the 38 districts would have more Republican votes, correct?  
8 A. I see that there, yep.  
9 Q. And then in the real world, the Republicans won 27 seats?  
10 A. Correct.  
11 Q. So again, your analysis based on the statewide elections was  
12 off by three votes in a, what, 38-seat body, right?  
13 A. From the math there, that's the difference between 27 and 24.  
14 Q. Right. Three seats is a lot in a 38-seat body, isn't it?  
15 A. It really depends on the context. And the point is not that  
16 if you have one election, that you will somehow predict there  
17 to be exactly the number of Republican victories as what the  
18 statewide elections would have favored. That's not the point  
19 at all.  
20 As I said, when we construct, say, a partisan  
21 measure using a long range of statewide elections, it's a  
22 long-run expectation. You expect that over several  
23 elections, some will inevitably be a Republican tide, some  
24 will inevitably be a Democratic tide, and some will be more  
25 even. But over the long run in expectation there are 24

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1 the Republicans or something like that.  
2 Q. So you're not even an expert in making general predictions  
3 about the composition of the Congressional or State Senate or  
4 State House delegations?  
5 MR. YEAGER: Objection, asked and answered.  
6 Misstates the testimony.  
7 You may answer.  
8 THE WITNESS: Okay. That's not what I said, and  
9 that is not what I said earlier.  
10 BY MR. CARVIN:  
11 Q. Well if you can't forecast specific cases, how in the world  
12 can you forecast the general composition of the delegation?  
13 MR. YEAGER: Hold on. You interrupted the last  
14 answer, do you want to withdraw that question? Or do you  
15 want him to answer the rest of the question, the prior  
16 question?  
17 MR. CARVIN: Go ahead and answer the question.  
18 MR. YEAGER: The prior question?  
19 MR. CARVIN: Whatever will get us through this  
20 quicker.  
21 After you filibuster, please answer the question.  
22 MR. YEAGER: Let's stop and take a break.  
23 (At 3:32 p.m. went off the record.)  
24 (At 3:41 p.m. went on the record.)  
25 MR. CARVIN: Back on the record.

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1 districts that are -- 24 districts is what's most likely to  
2 emerge in expectation.  
3 That's not making a specific prediction that I know  
4 with some degree of certainty that it will be exactly 24 in  
5 any particular election.  
6 So in other words it doesn't surprise me at all  
7 that you can have one election and the deviation from the  
8 number 24 could be three. That's really just to be expected.  
9 Q. So it wouldn't surprise you at all in one Senate election if  
10 your predictions based on the statewide analyses was off by  
11 three seats, right?  
12 A. I think that's just what I said is that it's really not at  
13 all surprising to see that you have election results that,  
14 over several elections, cluster around the predicted number  
15 which in this case is 24.  
16 So clustered around means that there is inevitably  
17 going to be some deviation.  
18 Q. Hum-hum. And that deviation might well occur in 2018 or 2020  
19 as far as you know?  
20 A. Yeah. The same caveats, that I'm not making any specific  
21 prediction about 2018.  
22 Obviously there is no such thing as saying we can  
23 take this statewide measure and say with accurate certainty  
24 that the Republicans will win exactly 24 and no more or no  
25 less. That's not the point of measuring the partisanship

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1 using statewide elections like this.  
2 Q. You used efficiency gap and mean-median differences, at least  
3 a robustness check on your partisan skew analysis, right?  
4 A. I used them to look at the partisanship of the districting  
5 plans. They are generally robustness checks.  
6 Q. I thought that's how you characterized them.  
7 A. I'm affirming that they are robustness checks.  
8 Q. Okay. Is there a generally accepted view in the political  
9 science community about what efficiency gap scores  
10 constitutes an extreme or unacceptable partisan bias?  
11 A. I'm not going to characterize -- I'm not sure I'm in a  
12 position to characterize the entire literature in the entire  
13 political scientist field.  
14 Obviously I'm aware that some people have opined  
15 about what constitutes an extreme efficiency gap. It's not  
16 something that I take a particular opinion on. Obviously I'm  
17 aware that some others have, and I'm clarifying that I am not  
18 taking an opinion.  
19 Q. So it's not a consensus or well-accepted view, it's  
20 individual opinions about this?  
21 A. I'm not sure I surveyed the field enough to say for sure  
22 whether there is something approaching a consensus. I'm just  
23 not really in a position to do that kind of survey and tell  
24 you what the field thinks.  
25 Like I said, some people think there is some

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1 of an outlier or red flag automatically by virtue of being  
2 above X percent.  
3 Q. I can give you examples, but in your report you use the words  
4 Democratic districts have been packed and cracked. And I'm  
5 just trying to get your definition of those terms. What's  
6 your definition of a packed district?  
7 A. So because you're talking about when I use those terms at the  
8 end of my report, right?  
9 Q. Certainly at the end, but I think there was a couple of  
10 occasions before that. But regardless --  
11 A. Okay.  
12 Q. -- what's your definition --  
13 A. Of packing and cracking, okay.  
14 I'll give you my best shot. I'll qualify in  
15 general that by saying that as a political scientist I don't  
16 understand those terms to mean anything precise in any  
17 academic sense. Meaning that there is no standard or set  
18 political science definition of how do you quantify what  
19 rises to the level of clear cracking or packing. There is  
20 just not an objective scientific definition of that.  
21 And so when I use the term cracking and packing,  
22 those are terms that are really just borrowed from what  
23 people use colloquially, from what the popular press uses,  
24 from what journalists use. Obviously journalists use those  
25 terms.

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1 particular threshold that that person thinks is extreme. I'm  
2 not sure if that's the exact characterization that some  
3 people would use and obviously others don't. I'm  
4 acknowledging there is a diversity of opinion.  
5 Q. Can you give me an example?  
6 A. Can I give an example?  
7 Q. Of a number that somebody thinks --  
8 A. Oh, of a number? I don't want to make something up off the  
9 top of my head. I'm generally aware that some scholars have  
10 cited an actual percentage. And I can't accurately attribute  
11 to somebody a precise percentage off the top of my head. But  
12 I'm aware that's been done in different forms.  
13 Q. I can ask you the same questions for the mean-median  
14 difference, and I will. Is there any consensus or  
15 well-accepted view about what constitutes an unacceptable or  
16 extreme mean-median difference score?  
17 A. Not that I'm aware of. I think there are recognized methods  
18 of -- there are recognized methods of arriving at a way to  
19 quantify what might be an extreme mean-median, just as  
20 certainly there have been approaches used to try to quantify  
21 what sort of efficiency gap one might expect in a particular  
22 state.  
23 I think sometimes those can be context or geography  
24 dependent. But I'm not aware of any, say, broad consensus  
25 that a mean-median gap over X percent is somehow, some sort

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1 And I generally understand what the popular media  
2 means when it uses those terms. Again, I don't have a  
3 precise academic objective definition of crack and packing.  
4 But I tried to operationalize that in the context of my  
5 analysis here by taking what I understand others to mean by  
6 those terms, by the terms crack and packing.  
7 So I'll give you now my best shot at explaining how  
8 I operationalized and defined those terms here in my report.  
9 So I just wanted to make all those qualifications first.  
10 What I call a -- we will just start with packing.  
11 What I operationalize a packed district to be, and again this  
12 is just my best shot at trying to put an operation to what  
13 others mean by the term, is to say if there is a district  
14 that is a certain percentage Democratic vote share, just as  
15 an example, and it's an enacted district, and it has a  
16 certain percentage Democratic vote share, and then I go look  
17 at alternative computer-simulated districting plans, and look  
18 at the same district in that same geographic area, as the  
19 enacted district, and I look at several simulated districts  
20 in that same geographic area, and I look at the partisan vote  
21 share, the Democratic vote share of those alternative  
22 computer-simulated districts, and I see that the vast  
23 majority of those alternative computer-simulated districts in  
24 that same geographic area are less Democratic leaning, have a  
25 lower Democratic vote share, in other words, a higher

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1 Republican vote share, than that enacted district, that I  
2 just for shorthand call packed.  
3 Again, not a scientific term in any way, just  
4 trying to operationalize it.  
5 Q. I'm confused. You're saying that if the alternative plans  
6 have a lower Democratic percentage, then anything above that  
7 percentage is packed?  
8 A. No. I got it backwards. And I apologize if I misspoke and  
9 mislead you there. I'll put some actual numbers to try to  
10 make this clearer.  
11 So let's suppose that the enacted district number  
12 one, hypothetical district, has a 70 percent Democratic vote  
13 share. And then we look at the computer-simulated districts  
14 in that same geographic area, covering the same geographic  
15 area, and they all have lower than a 70 percent Democratic  
16 vote share, that I just label packing.  
17 Q. All right. Let's assume district one has got a 53 percent  
18 Democratic vote share, and all the alternatives are at 52.  
19 Are you arguing that the 53 percent is a packed district?  
20 A. If it's one thousand out of one thousand, I'm applying that  
21 same shorthand label packing. It's just a purely  
22 mathematical operationalization.  
23 Q. So any time an enacted plan in this case has a higher  
24 Democratic percentage than the simulated plans, it's a packed  
25 district?

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1 A. Than virtually all the simulated districts in that same  
2 geographic area, I'm labeling that packing.  
3 Q. And that's for above 50 percent.  
4 For below 50 percent, is the district cracked when  
5 the enacted plan has a lower Democratic percentage than the  
6 simulated plans?  
7 A. Let me -- if I could, let me just review my report and I want  
8 to make sure I get this absolutely right, so if you could  
9 allow me a moment.  
10 Q. Yes.  
11 A. Okay, thank you for that.  
12 Yeah, I think your characterization there was --  
13 basically I'm going to put it in my own terms to make sure I  
14 got it right, but I think this is the same thing as what  
15 you're saying.  
16 So for cracking, what we're describing here is if  
17 there was a district where, and I believe I used 95 percent,  
18 if 95 percent of the simulated districts are on the other  
19 side, in terms of partisan vote share, then it's  
20 characterized as, with the label crack, cracking.  
21 Q. Just to be clear, when you say on the other side, you don't  
22 necessarily mean that the seat switches, but are on the other  
23 side in terms of the higher Democratic percentage?  
24 A. Correct. I'm not necessarily saying anything about the seat  
25 flipping above or over 50 percent. It's purely relative to

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1 the enacted district comparison.  
2 Q. So you would call any Democratic district cracked at 48  
3 percent if the middle 95 percent was 48.5 or higher?  
4 A. Right. The 50 percent cutoff that I think you're thinking  
5 about, that's not relevant here.  
6 Q. No, but can you answer my question?  
7 A. Sure, I apologize. That's right.  
8 I mean you're just looking at whether there are,  
9 say, something like 95 percent or more of the simulated  
10 districts that are all on one side or the other.  
11 Q. Okay. So you're using packed and cracked in a very specific  
12 way that applies only to your simulation analysis. You're  
13 not using it in the way that's used in most political science  
14 literature, is that what I understand?  
15 A. Well I'm not going to try to characterize how, quote, most  
16 political science literature uses it. I don't have the basis  
17 for answering that.  
18 I am acknowledging that this is an  
19 operationalization of the cracking and packing terms that is  
20 specific to my analysis here.  
21 Q. Do you have an understanding of how the term is generally  
22 used in political science, packed for example?  
23 A. Well the reason I gave that caveat, that long caveat at the  
24 beginning, I'm saying look, I don't understand the terms  
25 packing and cracking to mean anything very precise in

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1 political science literature. I'm obviously aware that other  
2 scholars have used it before in academic literature, and I've  
3 seen it used in slightly different ways and slightly  
4 different contexts. And to my knowledge or at least to the  
5 extent of my expertise, there is not a single objective  
6 operationalizable, clearly understood in a scientific manner  
7 objective definition of exactly what packing and what  
8 cracking is.  
9 That's why I gave that very long caveat just to say  
10 that what I'm trying to do is just to understand how I think  
11 it's popularly used and do my best shot at applying it here.  
12 Q. Do you have a view on what constitutes a competitive  
13 district?  
14 A. I don't really have a precise definition. Again same answer  
15 there, I'm aware that --  
16 Q. What would you say the most accepted view in the political  
17 science literature is?  
18 A. I really couldn't say.  
19 Q. Would you say 45 to 50?  
20 A. I really couldn't say whether that's somehow the most  
21 accepted viewed or not. I mean I'm generally aware that  
22 people have tried to quantify it, but I really couldn't give  
23 any sort of informed, precise answer, other than to say  
24 obviously I know in the literature people do try to quantify  
25 competitive --



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1 Q. 40 to 60, would that be a potential definition of  
2 competitive?  
3 MR. YEAGER: Asked and answered.  
4 You can answer.  
5 THE WITNESS: Same answer as before. I'm aware  
6 that people have tried to operationalize it by saying  
7 something like is this a district that is within X to Y  
8 percent of a 50/50 line, something like that. I'm generally  
9 aware that people have tried that.  
10 I'm just not comfortable saying that there is any  
11 sort of real consensus on the one right way to do it.  
12 BY MR. CARVIN:  
13 Q. All right. If you could turn to page 17 in your report,  
14 please.  
15 A. Okay.  
16 Q. The top table, and this reflects the 2006 through 2010  
17 statewide elections?  
18 A. Yes. I see that.  
19 Q. And 32 percent of the simulated maps produce an eight  
20 Republican, six Democratic plan for Congress?  
21 A. I see that there, yes.  
22 Q. Okay. And let me see. And 77.8 percent produce a plan with  
23 at least seven Republicans?  
24 A. I think you're adding up -- sorry, I believe you're adding up  
25 45.3 and you're adding 32 to that, so that's 77.3 percent. I

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1 Q. Right.  
2 A. I'm happy to -- maybe this isn't responsive to your question,  
3 but I would be happy to walk you through and explain  
4 statistically how I would analyze such a hypothetical  
5 question.  
6 Q. Well I'm just asking in lay terms because it's getting really  
7 late and I really don't want to go into extended digression.  
8 How can something that conformed to 32 percent of the  
9 nonpartisan plans be viewed as a partisan outlier?  
10 A. Well, okay, you're basically asking me how I would analyze  
11 it. And I'm happy to explain that.  
12 So as I said some time ago, what I do when I  
13 compare the enacted plan to the computer-simulated plans with  
14 respect to any of these measures, and earlier we talked about  
15 a compactness measure and now we're referring to a  
16 partisanship measure, I would do a statistical confidence  
17 interval. And that's constructed by something called --  
18 Q. I understand.  
19 A. I won't keep going. I'll stop answering.  
20 Q. Back at the envelope, do you really think this would be  
21 outside the 95 percent confidence interval, eight Republican  
22 seats? Honestly, do you really think that could happen with  
23 32 percent of the simulated plans coming out --  
24 MR. YEAGER: Incomplete hypothetical, asked and  
25 answered, and vague and ambiguous.

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1 agree with your math.  
2 Q. All right. So if the enacted plan had produced an  
3 eight-Republican delegation, that would not have been a  
4 partisan outlier?  
5 A. I didn't do that analysis. I'm happy to tell you how I would  
6 do that analysis in terms of statistical tests. But I'm just  
7 clarifying that I did not analyze that hypothetical.  
8 Q. Okay. Okay. But it would be consistent with 32 percent of  
9 the plans that were produced without any partisan intent,  
10 right?  
11 A. In your hypothetical where the enacted plan is an eight-six  
12 plan, right.  
13 Q. Right.  
14 A. Sure. I mean obviously by definition you're saying would  
15 that enacted plan have the same number of Republican seats.  
16 Q. And maybe I am misunderstanding your terminology.  
17 Are you saying that if it had, if the enacted plan  
18 had predicted an eight Republican seat delegation, you would  
19 consider that a partisan outlier based on 2006-2010 statewide  
20 elections?  
21 MR. YEAGER: Asked and answered.  
22 You can answer.  
23 THE WITNESS: Yeah, I said that I did not do that  
24 analysis.  
25 BY MR. CARVIN:

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1 You may answer.  
2 THE WITNESS: My answer is I won't speculate  
3 without doing the calculations.  
4 It's not as simple as saying, look, there are 32  
5 plans that are at eight, therefore it couldn't possibly be  
6 outside of let's say a 95 percent confidence interval. It's  
7 a little bit more involved in the statistical test than just  
8 that.  
9 I'm happy to go into that, but I don't think you  
10 want me to so I won't for now unless you ask me to.  
11 BY MR. CARVIN:  
12 Q. So let's stay with this.  
13 Do you know what the statewide Democratic vote was  
14 for year 2006 to 2010 statewide elections?  
15 A. What the overall Democratic vote share was --  
16 Q. Yes.  
17 A. -- in those elections?  
18 I'm sure I calculated that. I don't recall if I  
19 reported it. Obviously I can't remember off the top of my  
20 head.  
21 Q. And I'll stipulate to you that Professor Mayer using these  
22 said it was 53.2 percent statewide. Does that sound about  
23 right?  
24 MR. YEAGER: I'm sorry, Democratic or Republican?  
25 MR. CARVIN: Democratic statewide vote sharing.



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1 THE WITNESS: Fair enough, and if you wouldn't mind  
2 me asking you, 53.2 percent is the Democratic share of the  
3 two-party vote or the --  
4 BY MR. CARVIN:  
5 Q. Just two party.  
6 **A. So we're throwing out the third party.**  
7 Q. Yes.  
8 **A. Got it, thank you.**  
9 Q. And in those circumstances even with 53.2 percent of the  
10 statewide vote, 32 percent of the plans are only giving them  
11 six of 14 seats, which comes to 42.9 percent.  
12 **A. I'm sorry, where did the 42.9 --**  
13 Q. Six out of 14, do you want to do the math?  
14 **A. No. Maybe I just need you to repeat what -- your sentence**  
15 **there.**  
16 Q. Even though the Democrats had 53 percent of the statewide  
17 vote, 32 percent of the purely nonpartisan simulated plans  
18 only gave them 42.9 percent of the seats, six of 14.  
19 **A. I gotcha. So you're doing six divided by 14.**  
20 Q. Correct.  
21 **A. I'll take your word for it that the math is right. It sounds**  
22 **roughly right.**  
23 Q. Okay. Have you ever heard the phrase, seats-votes curve, or  
24 winner's bonus?  
25 **A. I have heard of those terms.**

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1 Q. Do you know how that's defined in the political science  
2 literature?  
3 **A. I'm not right here able to give you a precise definition.**  
4 **I'm happy to give you my best shot.**  
5 **But, you know, not having just reviewed the various**  
6 **literature on those topics, I'm not sure I can give you a**  
7 **precise definition right now.**  
8 Q. In broad strokes, isn't it true that what's characterized,  
9 the winner bonuses seats-votes curves you would expect a 53  
10 percent statewide vote to translate into either 56 or 59  
11 percent of the seats, have you ever heard that?  
12 **A. It's not quite as precise as saying 56 or 59, and there are a**  
13 **lot of other factors at play.**  
14 **But I get what you're trying to get at which is the**  
15 **general principle that all else being equal, that if your**  
16 **party has greater than -- a little greater than 50 percent of**  
17 **the two-party vote share, then all else equal, cancelling out**  
18 **all other factors such as things like political geography and**  
19 **other factors that affect districting and legislative**  
20 **elections, campaign finance, all those other things, all else**  
21 **being equal, you're going to get a bit of a bonus in terms of**  
22 **obviously 53 percent of the vote wouldn't necessarily**  
23 **translate into exactly 53 percent of the seat share.**  
24 **Now it's not as precise as saying 53 percent of**  
25 **votes translates automatically into a 56 to 59 percent seat**

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1 **share. It's never that clean at all because there are**  
2 **obviously lots of other factors such as the underlying**  
3 **political geography of a state, and various other districting**  
4 **criteria.**  
5 Q. None of which you've analyzed in Michigan, right?  
6 **A. Actually I have.**  
7 Q. So what is the winner's bonus to be expected in Michigan?  
8 **A. Okay. I was talking about the criteria that was mentioned.**  
9 **Obviously I've analyzed those.**  
10 Q. But you haven't analyzed how they affect the seats-votes  
11 curve or the winner's bonus in Michigan?  
12 **A. I did not try to quantify say an entire seats-to-votes curve**  
13 **insofar as trying to say if the Republicans were to**  
14 **hypothetically win 65 percent of the votes, what seats would**  
15 **they analyze.**  
16 **The underlying concepts are at the heart of the**  
17 **analysis that I did at the end of my report where I'm**  
18 **applying, say, a uniform swing to different elections.**  
19 **Now I'm not saying that's a complete seats-to-vote**  
20 **curve, but the principle is the same there. So to that**  
21 **limited extent --**  
22 Q. We'll come back to that.  
23 Isn't the fact that 32 percent of the wholly  
24 nonpartisan plans only give Democrats 42.9 percent of the  
25 vote, when they get 53 percent of the statewide vote, at

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1 least an indication that the state naturally skews Republican  
2 even through neutral redistricting?  
3 **A. Okay. Your question there I think you said 42 percent of the**  
4 **vote, and I think you probably meant to say seats.**  
5 Q. Seats. Right.  
6 **A. So you're asking is that indicative of political geography?**  
7 **Is that your question?**  
8 Q. Doesn't that tend, the natural geography and the  
9 concentration of Democratic voters together tend to favor  
10 Republicans even in a neutral redistricting scheme?  
11 **A. I'm going to answer that the best that I can.**  
12 **And in general, it's certainly the case that there**  
13 **is a political geography in Michigan that clusters Democratic**  
14 **voters. And as a general principle, that does have some kind**  
15 **of partisan effect as a very, very general matter, before**  
16 **specifically analyzing specific districting criteria. And**  
17 **that's true of a lot of different states.**  
18 **But one doesn't necessarily lead to the other. You**  
19 **cannot attribute all of that, or even a quantifiable, a**  
20 **specific portion of that to nothing but political geography**  
21 **in the context of, say, the study that I did here because the**  
22 **point is that I'm accounting for not just political**  
23 **geography, but also all of the specific operationalization of**  
24 **districting criteria that I'm programming into this**  
25 **simulation algorithm here.**

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1 Q. But if I understand you correctly, that means the simulated  
2 plans are a benchmark for the expected partisan results that  
3 would occur under a nonpartisan districting plan, right?  
4 A. There is just a bit of a distinction here between that  
5 question and your previous question.  
6 The interpretation of the simulation results that I  
7 make is simply to say this is, obviously this number of six,  
8 seven and eight Republican seats, this is the sort of  
9 distribution that we expect from the combined effect of,  
10 number one, obviously Michigan's underlying political  
11 geography, voter geography, boundary lines, political  
12 boundaries, applying them to the specific criteria that I  
13 built into the simulation algorithm. And I won't list all  
14 those but we've obviously discussed those at great length  
15 today. Building all those things together, all those combine  
16 to produce this particular distribution. So that's a fair  
17 statement.  
18 It's not a fair statement to say that a particular  
19 set of simulations is obviously skewed in a particular way  
20 because of voter geography or something like that. That's  
21 not something that is a fair conclusion from the simulations  
22 I'm analyzing here. It's the combination of all of those  
23 things.  
24 Q. Right. But I'll try again. The simulated plans, therefore,  
25 after taking all those factors into account, are an excellent

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1 Q. If you could turn to page 25 of your report. And you're  
2 writing on page 25 at the top about the efficiency gap from  
3 the simulated Congressional plans as presented on page 24,  
4 okay?  
5 A. I see page 24 here.  
6 Q. Okay. And you contend that this figure reveals that most of  
7 the one thousand simulated districting plans are reasonably  
8 neutral with respect to electoral bias, is that correct?  
9 A. Let me see exactly what I said here.  
10 I defined that, or I just made a calculation of,  
11 are they within 5 percent of zero. In other words are they  
12 between negative 5 to 5 percent. And I did that calculation.  
13 And I found that it was over half.  
14 Q. Right. And so a gap within 5 percent is minimal electoral  
15 bias in your view?  
16 A. It's a relative term here. I characterized it in that way.  
17 I'm not doing it in the absolute sense of saying that you can  
18 interpret it in any legal sense. But relative to other  
19 efficiency gaps that we see on this figure, obviously  
20 efficiency gaps within negative 5 percent to 5 percent are  
21 relatively smaller than some of the others that we see.  
22 I really didn't mean that phrase to mean anything  
23 more significant than just here is the calculation that I'm  
24 doing.  
25 Q. Okay. And you say 22.5 percent of the simulations produced

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1 benchmark for what partisan results should be expected from a  
2 nonpartisan redistricting, correct?  
3 A. Oh, what partisan results should be expected from a  
4 nonpartisan redistricting process like the one that I  
5 programmed. That is correct.  
6 Q. And we agree that's not the only nonpartisan redistricting  
7 program, but certainly in your view it's an excellent  
8 benchmark for what results we should expect from a  
9 nonpartisan process, right?  
10 A. Well I mean obviously you had asked me earlier today to  
11 acknowledge that there can in fact be a map drawer that is  
12 nonpartisan outside of my computer.  
13 So, again, I'm just qualifying that I'm not  
14 speaking for such hypothetical map drawers.  
15 Q. No, but your simulated --  
16 A. I'm speaking for my --  
17 Q. -- are a benchmark for what could be expected to be produced  
18 by a nonpartisan process, right?  
19 A. It is a benchmark for what could be expected to emerge from  
20 the sort of nonpartisan process that I programmed in my  
21 algorithm.  
22 I'm qualifying all of that to say that obviously  
23 I'm taking very specific criteria and building them into the  
24 computer code, and the computer code is just following those  
25 very specific criteria.

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1 an efficiency gap between minus one, which hurts Democrats,  
2 and plus one, which helps Democrats, using the 2006 to 2010  
3 statewide elections. Do I have that right?  
4 A. And I think that's referring to another figure. I'll try and  
5 identify it here.  
6 Q. It's on page 24.  
7 A. No. I mean it's not referring -- I don't think it's  
8 referring to that figure because that sentence is referring  
9 to the 2006 to 2010 statewide elections.  
10 Q. And that's set forth on page 24?  
11 A. I gotcha, I apologize. I was misreading there. I apologize  
12 for that.  
13 Q. Okay.  
14 A. I see that there. And I can see that I was characterizing  
15 that there are -- I mean I obviously did the calculation and  
16 I found that there were 22.5 percent that were within minus  
17 one to positive one percent.  
18 Q. And it's only the 2006 to 2010 that fall within that  
19 category, right? None of the 2012 to 2016 fall within that  
20 category?  
21 A. Let me go back to the figure.  
22 And just eyeballing the figure, and again, I can't  
23 do the calculations in front of me, but just eyeballing the  
24 figure, I believe that's right.  
25 It appears that those, most of those simulated

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1 plans that are within negative 5 to 5 percent are not within  
2 negative one to one percent. And I'm going to guess that  
3 that one outlier that we see is also not within one percent.  
4 So it does look like none of those are within minus  
5 one to one percent on the 2012 to 2016 election measures.  
6 Q. All right. In the 2006 to 2010, are there any that are  
7 positive? You say between positive 0.1, the best I can see  
8 is zero.  
9 Is there something above zero? We're all  
10 eyeballing this map.  
11 A. Yeah, I'm eyeballing it too.  
12 It looks to me like -- and I obviously don't have  
13 the underlying data file in front of me or I could give you a  
14 more precise answer. But it looks from this figure that  
15 yeah, there are some that are right above zero and some that  
16 are right below zero.  
17 But obviously they're all within one percent,  
18 they're not very far above. They are all right around that  
19 zero percent, that zero percent line, the horizontal line.  
20 Q. Well there are certainly none above 0.05?  
21 A. That's fair to say.  
22 Q. Okay.  
23 A. The point is they're all very, very close to zero, and there  
24 may well be some that are positive.  
25 Q. If you can go back to page 25, please.

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1 Referring to the same simulated plans, you say the  
2 simulated plans with nearly zero efficiency gap are all plans  
3 that contain exactly six Republican and eight Democratic  
4 favoring districts as measured by the 2006-2010 statewide  
5 election results, right?  
6 A. I see that sentence there.  
7 Q. Okay. So the only way not to waste Democratic votes in  
8 Michigan is to elect eight Democrats.  
9 A. Well that's not my conclusion. I'll put it in more -- I'll  
10 put that in more precise terms, which would be fair to say  
11 that -- it is fair to say that if you were looking among  
12 these one thousand Congressional maps and you wanted to find  
13 one that has an efficiency gap using specifically the 2006 to  
14 2010 statewide election measure, rather than the '12 to '16  
15 measure, then you would obviously be talking about plans that  
16 are six-eight.  
17 Q. Right. And --  
18 A. But now that was a little bit more limited than the question  
19 I think you were posing.  
20 Q. Well if your qualifications on the 2006 to 2010, those are  
21 the only ones that are anywhere near zero efficiency gap, and  
22 the only way they achieved it was by a plan that you project  
23 will elect eight Democrats?  
24 A. Okay. So you're basically just saying, look, on the '12 to  
25 '16 election measure, we've obviously discussed that there

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1 are not any that are right at zero percent. I think that's  
2 what you're asking me, right?  
3 Q. Right.  
4 A. Yeah. I affirm that.  
5 Q. It's a lot worse than that actually. For 2012 to 2016, the  
6 only results you have are at least 5 percent to 14-and-a-half  
7 percent negative efficiency gaps against Democrats, correct?  
8 A. Well I'm affirming that there is obviously a bunch of plans  
9 around negative 5 percent that we discussed earlier.  
10 Q. Well the results --  
11 A. I'm just -- I think you started the question by saying it's  
12 worse than that, obviously I'm not agreeing to any value  
13 judgement about this.  
14 Q. The 2012 to 2016 are worse for Democrats than the results  
15 measured in 2006 to 2010, correct?  
16 A. In terms of what, statewide vote share or --  
17 Q. Efficiency gap.  
18 A. It's not -- you're going to have to ask me about a specific  
19 group of simulations.  
20 Q. Isn't it true that the efficiency gap measured by the 2012 to  
21 2016 statewide elections have an efficiency gap of at least  
22 roughly negative 5 percent to negative 14-and-a-half percent  
23 for Democrats?  
24 A. The entire range, you know, obviously starts at a little bit  
25 above zero percent. But you're correct in characterizing

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1 that most of the simulations on that measure, the '12 to '16  
2 measure, go from roughly negative 5 to about negative 13 or  
3 14 percent.  
4 I just want to clarify that there was -- you can  
5 see there is one gray circle there that is right around one  
6 or 2 percent or so.  
7 Q. Okay. And why does it jump from -- why is there nothing  
8 between 5 and 14-ish?  
9 A. Why is there nothing --  
10 Q. Why are there no plans between 5 and 14?  
11 A. Well, that was -- those were the calculations on efficiency  
12 gap that I did. I mean I just calculated numbers, and I'm  
13 happy to tell you how I calculated the efficiency gap. But I  
14 just reported the numbers I calculated.  
15 Q. No, I'm just asking for a commonsense explanation.  
16 My inference is the reason you jumped from five to  
17 14 is because if it's say eight or nine, you'd get a  
18 different efficiency gap, and therefore you wouldn't have a  
19 wide range of numbers in the middle. You'd jump from one to  
20 the other because that's how the efficiency gap works.  
21 But if you have another intuitive explanation, I'm  
22 more than happy to hear it.  
23 A. In general what we're seeing there is indeed that there is  
24 obviously a correlation between the efficiency gap, a  
25 statistical correlation. I mean this is not saying that they

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1 are somehow equated, but that there is a correlation here.  
2 So recall that I had discussed -- we had discussed  
3 a moment ago that all of those plans that are right around  
4 zero percent on the '06 to '10 measure have a six-eight  
5 partisan composition. And that's just the way that the  
6 efficiency gap metric works.  
7 If it's not a six-eight, but instead a seven-seven  
8 plan, it's a different cluster. And if not a seven-seven,  
9 but instead an eight-six, then that's yet a different cluster  
10 altogether.  
11 I think your intuition was basically right, but I  
12 just wanted to clarify that that's what it's coming from.  
13 Q. You didn't produce the numbers for how many of your simulated  
14 plans produced the efficiency gaps in the 14 percent range  
15 that we're looking at? I can't figure that out.  
16 A. How many -- you're asking how many --  
17 Q. Yeah. I just see dots on the page. You never provided the  
18 numbers, right?  
19 A. Oh, how many numbers are in each of those clusters?  
20 Q. How many plans, right.  
21 A. I see that I don't obviously have numbers, precise number of  
22 dots in those clusters.  
23 Yeah, I'm not sure that I have in front of me right  
24 now the data to sort that out. Obviously my underlying data  
25 files report those efficiency gap numbers.

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1 Q. Okay. And give me your rough guess as to the percentage of  
2 efficiency gaps above 13 percent using the 2012 to 2016 on  
3 page 24.  
4 A. Above 13 percent?  
5 Q. Right.  
6 A. That's going to be a tough one because I'm going to guess  
7 that if you draw a 13 percent line right there, there are a  
8 bunch of observations right around 13. Do you see what I  
9 mean?  
10 Q. All right. Let's make it 12.  
11 A. Okay, great. So you're basically asking how many are in that  
12 range from negative 12 to negative 15 percent?  
13 Q. Right.  
14 A. Let me see if I can try and make a bit of an educated guess  
15 from my table here.  
16 Okay, I'm going to give you my best guess here.  
17 I'll qualify by saying obviously I don't have the underlying  
18 data here in front of me. If I did, I'd be able to actually  
19 calculate it. So what I'm giving you is a very, very rough  
20 guess. And I'm not telling you that this is a calculation  
21 that I remember off the top of my head.  
22 So I can see that it's going to be roughly around  
23 12 percent, something in the ballpark of 12 percent of the  
24 thousand simulations that are being depicted here, with all  
25 those caveats.

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1 Q. And how many are in the 5 percent range? You're saying 88  
2 percent?  
3 A. You're asking me the same question with respect to the '12 to  
4 '16 statewide elections, right?  
5 Q. Yes. It just strikes me as very odd the notion that the  
6 right hand is 88 percent when the virtually visually  
7 identical left hand is you're claiming 12 percent.  
8 A. And I'm just doing my best to give you a guess here.  
9 Obviously I'm not saying that I remember these numbers off  
10 the top of my head. Same caveats as before, if I had the  
11 data in front of me, I'd be able to give you a more precise  
12 answer.  
13 But my best guess here is that, yeah, it appears to  
14 be something in the ballpark of 87 percent.  
15 I think what you were alluding to in your question  
16 is I think you're saying that it seems odd to you because it  
17 looks like there are a bunch of clusters on the left column  
18 and there are a bunch of clusters in that middle column and I  
19 think you're trying to ask, well how can they be so different  
20 in size.  
21 But the point here is what I'm doing in this figure  
22 is I am stacking on top of one another a fairly large number  
23 of gray circles that are clustered at certain intervals.  
24 And when you see that clustering, sometimes -- it's  
25 hard to precisely count up the circles and see exactly how

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1 many there are in each cluster.  
2 But again my best guess here is 87 percent.  
3 Q. Okay. If you could turn back to page 25.  
4 A. Okay.  
5 Q. You say, to produce a map with a significant electoral bias  
6 deviating by over 15 percent from a zero efficiency gap would  
7 require extraordinary and deliberate partisan map drawing  
8 efforts. Correct?  
9 MR. YEAGER: Can you point out where that is, sir?  
10 MR. CARVIN: The last sentence in the second  
11 paragraph.  
12 BY MR. CARVIN:  
13 Q. I'm on page 25, Professor.  
14 A. Okay. I gotcha. I see it.  
15 Q. And I'm just wondering how you can draw that conclusion since  
16 at least a substantial percentage of the maps that had no  
17 electoral bias produced an efficiency gap of 13, 14 percent.  
18 Why would 15 percent be some demarcation line between a map  
19 motivated by extraordinary and deliberate partisan map  
20 drawing efforts, and the 13 to 14 percent that's produced by  
21 maps wholly devoid from partisan intent?  
22 A. Sure. The basis for my opinion on that is that I'm looking  
23 at these efficiency gaps that are merging using the '12 to  
24 '16 measure. And I'm seeing that there are in fact no maps  
25 that have an efficiency gap larger than negative 15 percent.

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1 In other words, more negative than negative 15 percent.  
2 Q. So we have -- please finish.  
3 A. I was just generally going to explain that so what I'm  
4 looking at here is that distribution.  
5 And of course I intuitively know that the sort of  
6 plans, because of the clustering that we see in this figure,  
7 I intuitively know that you're not going to get a greater  
8 than negative 15 percent efficiency gap with an eight-six  
9 plan because we're looking at a bunch of eight-six simulated  
10 plans here. And all of them have efficiency gaps something  
11 in the ballpark of 12 to 13 percent.  
12 So that demarcator as you called it of 15 percent,  
13 really to get over that line, we'd be talking about plans  
14 that are nine-five in their partisan composition.  
15 Q. So it's really the one Congressional seat, the eight versus  
16 nine?  
17 A. Yeah. I'm affirming that it is indeed the case that if you  
18 had had a Congressional plan with nine -- with a nine-five  
19 partisan composition, you'd be talking about an efficiency  
20 gap on this '12 to '16 statewide election measure that would  
21 be a bit higher than 15 -- a bit larger than negative 15  
22 percent, probably something closer to about maybe negative 19  
23 percent or so.  
24 Q. Right. So again we're talking about an eight-six plan could  
25 be produced by a nonpartisan line drawer, but a nine, for all

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1 when I say deliberate partisan map drawing efforts.  
2 So I just wanted to qualify that that's what I'm  
3 opining about here.  
4 Q. Okay. If we could turn to page 21, because I want to ask you  
5 the same questions about the median-mean difference.  
6 A. Okay. Let me get there.  
7 Okay, I am at page 21 now.  
8 Q. Okay. And it describes the results of the mean-median  
9 difference for the simulated plans, right?  
10 A. Yeah. I see that's what I'm doing in this paragraph.  
11 Q. And you say, second sentence, second paragraph, almost all  
12 the computer-simulated plans have a median-mean difference  
13 between 2 percent to 3.8 percent, using the 2006-2010, and  
14 between 2 to 3.6 percent using the 2012 to 2016 statewide  
15 elections, is that right?  
16 A. I see that sentence.  
17 Q. So every computer-simulated plan has a median-mean difference  
18 disfavoring Democrats, right?  
19 A. I'm not sure that I actually characterized it as disfavoring  
20 Democrats. I see what you're getting at which is to point  
21 that the median is higher than the mean, and I think that's  
22 all I really characterized it as.  
23 Q. Oh, all right. Are you detracting the notion that a  
24 mean-median difference of a positive nature disfavors  
25 Democrats?

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1 the reasons you previously articulated, requires this  
2 partisan intent as you previously described. So this  
3 essentially makes the same point is what you're telling us?  
4 MR. YEAGER: Objection compound.  
5 But you can answer.  
6 THE WITNESS: I'll clarify what I am actually  
7 concluding here. I didn't hear anything in your question  
8 that I thought was incorrect, but I'll just clarify what I  
9 concluded.  
10 I'm not sure that I specifically here used the word  
11 partisan intent. But I mean obviously I am reaching a  
12 result, reaching a conclusion regarding the partisanship, the  
13 way in which the partisan composition of the enacted map  
14 emerged.  
15 I'm saying here that that sort of plan does not  
16 emerge in one thousand simulation tries. And from a  
17 statistical standpoint that would be a -- it would be an  
18 extreme statistical outlier.  
19 That's all I mean when I say here in this last  
20 sentence, would require extraordinary and deliberate partisan  
21 map drawing efforts.  
22 I'm obviously not speaking to any firsthand  
23 knowledge about partisan effort. I'm simply saying that it  
24 could not have resulted from a process like the one that I  
25 programmed in my computer simulations. That's what I mean

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1 A. I mean I'll let it qualify that, if that's what you're asking  
2 me about. It obviously -- if you have a mean-median  
3 difference or a median-mean difference that is a higher  
4 median than mean, obviously that disfavors Democrats in the  
5 sense that it makes it harder to win that median district,  
6 because that median district is more Republican than the  
7 overall statewide.  
8 So just in their middle best district, it's a  
9 little bit harder, say in the hypothetical 50/50 participant  
10 context.  
11 Q. Right.  
12 A. So, sure. There is certainly an extent to which Democrats  
13 are disfavored. I just didn't want to give a blanket  
14 statement that every single district has somehow proven to be  
15 disfavoring Democrats because of a particular median-mean  
16 difference. I just wanted to clarify that.  
17 Q. Is a median-mean difference of, say, 3 percent considered a  
18 telltale sign of a partisan skew or partisan gerrymander?  
19 A. It's never been --  
20 THE WITNESS: If I could just ask you to repeat?  
21 (Record read: Q. Is a median-mean difference of,  
22 say, 3 percent considered a telltale sign of a partisan  
23 skew or partisan gerrymander?)  
24 THE WITNESS: I have never opined, and it's not my  
25 opinion, that any one particular threshold of a median-mean

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1 difference, whether 3 percent or anything else that you could  
2 name, is somehow a, quote, telltale sign. I always analyze  
3 the median-mean difference, the median-mean difference of a  
4 plan in the context of the actual states or the actual  
5 jurisdiction that we're considering here.  
6 Meaning that here obviously I'm considering a  
7 particular median-mean difference in the context of a number  
8 of computer simulations in the distribution along the  
9 median-mean difference.  
10 BY MR. CARVIN:  
11 Q. Right. You're always comparing the difference. And I'm just  
12 trying to figure out is there anything about the simulated  
13 plans' rough average of I'll say 3 to 3.5 percent, do you  
14 know how that stacks up nationally?  
15 A. Do I know how it stacks up nationally? I can't say that I've  
16 done a comprehensive national study and can really  
17 characterize for you whether the median-mean difference  
18 viewed in a particular Michigan plan is at the tail end or  
19 well within the middle of the distribution. I really haven't  
20 studied that question.  
21 Q. Do you know how 6.7 percent ranks nationally?  
22 A. Same answer as before. I don't have -- I don't have  
23 empirical basis to say that I've actually looked at the  
24 distribution nationally and can rank what a 6.7 percent would  
25 rank nationally across all 50 states.

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1 Q. If you could turn to page 41, please.  
2 A. Yes, sir.  
3 Q. Okay. And it's fair to say that looking at 2012 to 2016  
4 statewide elections, the vast majority of the simulated plans  
5 give Republicans 58 seats?  
6 A. I report here 74.9 percent, so that is certainly probably the  
7 vast majority or at least a very sizable majority.  
8 Q. And 91.8 percent of the plans give Republicans 58 or more  
9 seats, right?  
10 A. I'm guessing you took 74.9 percent and you added up 16.7  
11 percent to that?  
12 Q. Right.  
13 A. Roughly in the ballpark of 92 percent. Is that what you  
14 said?  
15 Q. Yes.  
16 A. Okay. I affirm the math or close enough. I affirm that  
17 you're pretty close probably.  
18 Q. So again, this -- for the record, how many seats are there in  
19 that Michigan House?  
20 A. We're still talking about the 2012 to --  
21 Q. No. It's 110 seats in the Michigan House.  
22 A. I gotcha, I apologize for misunderstanding your question.  
23 Yes, there are 110 seats or districts in the  
24 Michigan State House.  
25 Q. So even these 90 plus percent of these completely simulated

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1 plans would give Republicans a three-seat majority in the  
2 Michigan House, even though they are completely devoid of  
3 partisan intent, right?  
4 A. No. I'm not sure that's quite right. I don't really see --  
5 okay, you're asking about the 74.9 percent of the  
6 simulations, right?  
7 Q. Or 59 or 60.  
8 A. Okay. I apologize, I misheard the question.  
9 Obviously I agree that if the Republicans have 58  
10 out of 110, that's a three-seat majority. And again in 74.9  
11 percent of the simulated plans that's what we see. And  
12 obviously the same applies to that 92 percent figure we both  
13 calculated earlier.  
14 Q. Right. And in the real world, in 2012, the Republicans won  
15 59 seats in the House, right?  
16 A. In 2012 you said?  
17 Q. Yes.  
18 A. To my recollection, that is the case.  
19 Q. And that was the first year this was implemented. So in the  
20 first year after implementation, they achieved a seat share  
21 not different from what you would have expected under a  
22 totally nonpartisan redistricting plan, right?  
23 A. No. I mean what you did there is just an apples-to-oranges  
24 comparison. You are comparing the actual endogenous  
25 elections --

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1 Q. Yes, but I --  
2 MR. YEAGER: Let him finish.  
3 BY MR. CARVIN:  
4 Q. Go ahead.  
5 MR. YEAGER: Unless you want to withdraw the  
6 question.  
7 BY MR. CARVIN:  
8 Q. No. I'm perfectly happy to clarify.  
9 A. I think I understood the question.  
10 What you did there in your question was to compare  
11 the number of Republican seats in the legislative elections  
12 in the House elections themselves.  
13 Q. Right.  
14 A. But then you compared that to a distribution here in figure  
15 13 where I'm reporting on the distribution with respect to  
16 the number of Republican seats using the 2012 to 2016  
17 statewide elections aggregated.  
18 Q. Right.  
19 A. And so that's -- that's obviously an apples-to-oranges  
20 comparison. You can't just say, well there was 58 in the  
21 State House legislative election results, and that is somehow  
22 equated to the number 58 on this figure, which is calculated  
23 using the 2012 to 2016 statewide election results.  
24 Q. I'm somewhat puzzled why you think your statewide elections,  
25 which are designed to predict, or designed to assess



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1 elections in the real world, are apples, and the real world  
2 election results are oranges.  
3 You're telling me there is not really much -- there  
4 is a very significant difference between your statewide  
5 elections and elections in the real world?  
6 **A. That's not what I'm saying. What I'm saying is that if you**  
7 **want to directly compare the enacted plan to a distribution**  
8 **of simulated plans --**  
9 Q. Right.  
10 **A. -- you need to evaluate both of those sets, both of those**  
11 **things using the same statistical metrics, the same**  
12 **quantified metric of partisanship.**  
13 And so certainly I do that in figure 13. The  
14 question that you had posed a moment ago was not doing that.  
15 You were using one set of elections on one side to evaluate  
16 the enacted House plan, and then another set of elections to  
17 describe the simulated plans.  
18 Q. Right. You're predicting --  
19 **A. That's what is an apples-to-oranges comparison.**  
20 Q. You've assigned 61 seats to the House on the basis of  
21 statewide elections which were exogenous. In the real world  
22 they got 59, right?  
23 **A. Okay.**  
24 Q. Is that true?  
25 **A. Your characterization was not correct. So I'm happy to go**

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1 **A. What I said is apples and oranges was to say that somehow**  
2 **taking the number 59 from the endogenous elections, and then**  
3 **comparing that to the 58 or 59 here that we see in this**  
4 **distribution, using the exogenous elections, would be a valid**  
5 **comparison. That's what the apples-to-oranges comparison**  
6 **that I was referring to is.**  
7 Q. Right. The results produced by the 2012-2016 statewide  
8 elections, and the results produced in the real world are  
9 apples and oranges?  
10 **A. That's not what I said.**  
11 I said to equate by saying that the enacted House  
12 plan is to be evaluated using a different election than the  
13 2012 to 2016 statewide election, that comparison of the  
14 enacted plan to a distribution would be an inappropriate  
15 apples-to-oranges comparison.  
16 Q. Okay. Now let's assume the result was 62 using the statewide  
17 elections. That would obviously be impossible to do absent a  
18 severe partisan intent, correct?  
19 MR. YEAGER: Objection, incomplete hypothetical.  
20 You may answer.  
21 THE WITNESS: Okay. When you're saying 62, I'm not  
22 sure if you are referring to a hypothetical State House  
23 election result or if you're referring to --  
24 BY MR. CARVIN:  
25 Q. Any plan that produces 62 Republican seats as measured by the

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1 and correct that here.  
2 Q. Your assessment of the expected Republican seats under the  
3 enacted House plan based on the 2012 to 2016 statewide votes  
4 is 61, is that correct?  
5 **A. The 61 refers to --**  
6 Q. Is that correct?  
7 **A. I'm not sure that's how I would characterize it. I'm just**  
8 **going to put it in my own words and I think this is**  
9 **responsive to your question.**  
10 The 61 for the enacted House plan that we see with  
11 the red line, that refers to the number of districts in the  
12 enacted House plan out of 110 that have more Republican than  
13 Democratic votes in the 2012 statewide elections.  
14 Q. Right. And in the real world they got 59 in 2012, correct?  
15 **A. And now you're talking about --**  
16 Q. Is that correct?  
17 **A. I'm just -- I just want to clarify my understanding of your**  
18 **question.**  
19 And now you're talking about the actual State House  
20 election results. And I'm affirming that indeed in the State  
21 House election results in 2012, it was 59.  
22 Q. Okay. And that you think that the comparison of the real  
23 world election results and the number that you have assigned  
24 61 is a comparison of apples and oranges, is that your  
25 testimony?

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1 2012 to 2016 statewide elections is necessarily a product of  
2 partisan intent, right?  
3 **A. Okay. So you're asking if I had seen a plan, if I had seen**  
4 **an enacted plan, would I have reached that conclusion?**  
5 I would look at this distribution. If we had a  
6 plan all the way out at 62, I would have concluded that that  
7 creation, that plan's creation of 62 Republican seats is a  
8 statistical outlier on partisanship that is not something  
9 that generally ever really occurs in these one thousand  
10 simulations.  
11 Q. And it wouldn't be possible to produce that result if there  
12 was no partisan intent behind the line drawing, right?  
13 MR. YEAGER: Objection, incomplete hypothetical.  
14 You may answer.  
15 THE WITNESS: My conclusion is limited to saying  
16 the following, that such a plan, a 62 plan, a 62 Republican  
17 plan could not plausibly have been the result of a  
18 nonpartisan districting process of the sort that I programmed  
19 into my, in my expert report, obviously with the nonpartisan  
20 criteria that I built into the computer code.  
21 So that's what I mean when I say this is a partisan  
22 outlier.  
23 BY MR. CARVIN:  
24 Q. Okay. If you could turn to page 51, please.  
25 Just to make it clear, we're now talking about the



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1 House plan, because we've been jumping around a little bit.  
2 I'm going back to what we were talking about before.  
3 And you say, do you not, at the top of page 51,  
4 that the mean-median figure reveals that most of the one  
5 thousand simulated districting plans reflect a small amount  
6 of electoral bias in favor the Republicans -- I apologize,  
7 that's referencing the efficiency gap, I may have just misled  
8 you.  
9 On page 49 you describe what you're looking at in  
10 terms of the efficiency gap, and at the top of page 51 you  
11 give the example.  
12 **A. Okay. You're at the sentence that says the fact that the one**  
13 **thousand simulated plans in figure 17, is that right?**  
14 Q. Yes. Well I actually think we're looking at figure 18.  
15 If I misled you, I want to go to the efficiency gap  
16 numbers now in the House.  
17 **A. Okay. I'll just -- if it's helpful I will point you to where**  
18 **the text is and maybe this is where you're trying to point me**  
19 **to.**  
20 **Page 51 --**  
21 Q. Right.  
22 **A. -- second paragraph, is that where you're going?**  
23 Q. Right. And your description, just so I'm clear is that most  
24 of the one thousand simulated districting plans reflect a  
25 small electoral bias in favor of Republicans. Do I have that

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1 right?  
2 **A. Significantly more wasted Democratic votes than wasted**  
3 **Republican votes, yes. So, yes, you could characterize that**  
4 **gap as a small bias in favor of the Republicans.**  
5 Q. And if you look at the graph on page 50, the 2012 to 2016  
6 numbers?  
7 **A. Okay.**  
8 Q. It looks to me, given these clusters, that the substantial  
9 majority of the plans have an efficiency gap of negative nine  
10 to negative ten, is that fair?  
11 **A. Around that cluster, I see the two clusters you're talking**  
12 **about. And, yeah, I can see there with one cluster that's**  
13 **roughly from about, we'll call it maybe about 8.7 to roughly**  
14 **9.3 or so. And then there is another cluster to the left of**  
15 **that that's around maybe 9.8 or so to about 10.2 or so.**  
16 Q. Right.  
17 **A. I think those are the two clusters you're referring to.**  
18 Q. Right. Would you say that an efficiency gap of nine or ten  
19 reflects a small amount of electoral bias?  
20 **A. I wouldn't really ever characterize something in absolute**  
21 **term. It's all relative. I have to know small compared to**  
22 **what.**  
23 **I would certainly characterize it as -- I would**  
24 **characterize it as small in relation to the enacted plans,**  
25 **the efficiency gap. It's small in relation to--**

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1 Q. I thought the enacted plan's efficiency gap was 12.1 percent  
2 under the '12 to '16 numbers. Do I have that wrong?  
3 **A. That sounds about right. I see that's right around 12.1**  
4 **percent. So I was answering the previous question.**  
5 **I was just saying that -- you were asking me if I**  
6 **could characterize that as small, and I usually just need to**  
7 **know small in relation to what.**  
8 **Certainly it's small in relation to a 12.1**  
9 **percent --**  
10 Q. Ten is small in relation to 12?  
11 **A. Okay. I just want to try to finish answering your previous**  
12 **question first.**  
13 Q. Okay.  
14 **A. It's certainly small in relation to the enacted plan's**  
15 **efficiency gap of negative 12.1 percent. It really just**  
16 **depends on what the context is.**  
17 **So I would characterize in that context as small,**  
18 **but obviously I'm not opining that a general efficiency gap**  
19 **of say, 9 percent is small in any absolute universal sense.**  
20 Q. How would you characterize it without reference to the  
21 comparison to the enacted plan?  
22 **A. Well I would characterize it as just what I've been saying.**  
23 **It's roughly 8 --**  
24 Q. Would you characterize it as small?  
25 MR. YEAGER: Asked and answered.

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1 THE WITNESS: What I just said --  
2 BY MR. CARVIN:  
3 Q. Without reference to the enacted plan, would you characterize  
4 it as small?  
5 MR. YEAGER: Asked and answered.  
6 You may answer.  
7 THE WITNESS: Without reference to the enacted plan  
8 or any other sort of benchmark or reference points, I'm not  
9 really sure that I can really, I can really answer that.  
10 It's always within reference to some kind of  
11 benchmark.  
12 It would be like if I asked you is 58 a big number?  
13 And obviously there is no right answer to that, it depends is  
14 58 bigger than some other number. You need a reference  
15 point.  
16 And I'm just saying if the enacted plan is the  
17 reference point, then I'm able to say that.  
18 BY MR. CARVIN:  
19 Q. That's entirely right, you need a reference point. And our  
20 reference point for plans that are completely unbiased drawn  
21 by your neutral process produce an efficiency gap of 9 to 10  
22 percent. We therefore must analyze the enacted plan as 12.1  
23 percent in light of that gap, correct?  
24 **A. Well that's certainly what I do. I analyze the enacted plan**  
25 **in reference to the distribution of the simulations.**

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1 Q. Right. And in other circumstances, a 9 to 10 percent  
2 efficiency gap could be characterized as severely  
3 anti-Democratic. You've been involved in litigation where  
4 it's been characterized that way, haven't you?  
5 **A. I'm not specifically aware of that. I'm happy to take your**  
6 **word for it. Obviously I've said that's not the sort of**  
7 **characterization I ever make in my academic work or expert**  
8 **work. But --**  
9 Q. But -- please.  
10 **A. I'm happy to take your word for it that out there that other**  
11 **people, may be litigants who like to put those kinds of**  
12 **characterizations.**  
13 Q. This number reveals, does it not, that there is a relatively  
14 large inherent bias against Democrats under a neutral  
15 Michigan redistricting plan that produces a 9 to 10 percent  
16 efficiency gap?  
17 **A. I'd said what it generally reveals if you're producing a**  
18 **partisan-neutral redistricting plan for Michigan's House**  
19 **districts, and you follow a specific criteria that I followed**  
20 **in my computer code, which we've talked about at length, then**  
21 **you're generally going to end up with efficiency gaps in this**  
22 **range that we've been talking about. I think that's an**  
23 **accurate characterization.**  
24 Q. And even holding apart from partisan intent, you would have a  
25 relatively substantial efficiency gap disfavoring Democrats

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1 in Michigan, correct?  
2 **A. I mean it's fair to characterize that efficiency gap as a**  
3 **range, as one where clearly there are some more number of**  
4 **wasted Democratic votes than wasted Republican votes. That's**  
5 **how I would characterize an efficiency gap in this sort of**  
6 **range that we're talking about.**  
7 Q. All right. Well let's talk about the mean-median difference  
8 from the House, right?  
9 You characterized the -- I'm now on page 49. And  
10 you say that the small mean-median differences in the  
11 computer-simulated plans reflects a modest skew. Right?  
12 That's how you characterized it, a modest skew?  
13 **A. Yes, I see that sentence.**  
14 Q. If you'd turn to page 47.  
15 **A. I am there.**  
16 Q. Okay. You can see that the mean-median difference using the  
17 2012-2016 statewide elections is 4.5 to 6 percent, correct?  
18 **A. Okay. You're in the second paragraph where it says using the**  
19 **2006 to 2010 statewide elections --**  
20 Q. I'm actually in between --  
21 **A. Right. I know what you're talking about. And between 4.5**  
22 **percent to 6.0 percent, using the '12 to '16 statewide**  
23 **elections. I see that sentence.**  
24 Q. And the mean-median difference in the enacted plan is 5.19  
25 percent using admittedly the 2006 to 2010 statewide

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1 elections, correct?  
2 **A. Let me just try and see where I reported that number. And**  
3 **5.19 percent, I see that, okay.**  
4 Q. So that is very much a modest skew, very much in line with  
5 the mean-median difference produced by the completely  
6 nonpartisan simulated plans, right?  
7 **A. No, you're talking about an apples-to-oranges comparison here**  
8 **again.**  
9 Q. All right.  
10 **A. When we're calculating a median-mean difference, here is the**  
11 **essential points of the mean-median difference. And I really**  
12 **want to explain this because it's such an important point.**  
13 **The median-mean difference is calculated as the**  
14 **difference between the median district and the mean district**  
15 **vote share. It's not exactly the same, but it's usually very**  
16 **similar to the overall statewide vote share. If you take the**  
17 **mean of all 110 House districts, you're getting something**  
18 **close to, not precisely, the overall statewide vote share in**  
19 **all of Michigan.**  
20 **So that is a measurement, this median-mean**  
21 **difference is a measurement that is anchored around, maybe**  
22 **with reference point to, the overall partisanship of the**  
23 **states in whatever set of elections were analyzed.**  
24 **So if there is a difference in the overall**  
25 **partisanship in one set of elections versus another, then**

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1 **you're talking about a somewhat different anchoring point in**  
2 **the median-mean difference.**  
3 Q. I got it.  
4 **A. So what that means is just that when we're making comparisons**  
5 **between the enacted plan and the simulated plans, using the**  
6 **median-mean difference, you really have to be sure to make an**  
7 **apples-to-apples comparison using the same set of election**  
8 **results.**  
9 Q. All right. But you're not retracting your statement in the  
10 report that the 4.5 to 6 percent mean-median difference in  
11 the simulated plans is a modest skew, are you?  
12 **A. I'm just trying to find where we are here.**  
13 Q. I just read it to you from page 49. You characterized the  
14 4.5 percent to 6 percent as a small median-mean difference  
15 that reflects a modest skew.  
16 **A. Which line are we on where we have the 4 percent?**  
17 Q. The 4.5 to 6 percent is on page 47.  
18 **A. Okay, I gotcha.**  
19 Q. And you characterize that mean-median difference, as well as  
20 the other one, you characterized it as small median-mean  
21 differences in the computer-simulated plans that has a modest  
22 skew.  
23 Do you see that on page 49?  
24 **A. Now we're back to 49. I just want to understand where you**  
25 **are, where you're reading from.**

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1 And can you point me to the line on 49 that you  
2 just read from?  
3 Q. The second sentence on page 49. The small median-mean  
4 differences in the computer-simulated plans may also  
5 partially reflect a modest skew in Michigan's voter geography  
6 that slightly benefits the Republicans in the district. This  
7 modest skew in the simulated district plans, and you go on.  
8 A. I gotcha. Sure. I'm happy to explain the basis of that if  
9 that's what you're looking for.  
10 Q. I'm not asking that. I'm asking whether or not the 5.19  
11 percent median-mean difference is also a small median-mean  
12 difference?  
13 A. No. I wouldn't characterize that as a small median-mean  
14 difference.  
15 Q. Then why is 4.5 to 6 percent a small median-mean difference,  
16 but 5.19 percent is not?  
17 MR. YEAGER: Objection, misstates the documents.  
18 You may answer.  
19 THE WITNESS: I'm going to try to clarify here. As  
20 I said before when we were distinguishing the efficiency gap  
21 at length, to characterize something as small, you do it in  
22 the context of some kind of reference point.  
23 So when we're talking about the median-mean  
24 difference of 5.19 percent using the '06 to 2010 statewide  
25 elections, I'm characterizing that as extreme with reference

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1 to the distribution of simulations as measured using those  
2 exact same statewide elections.  
3 So if we switch to another set of elections, then  
4 that obviously is talking about a different reference point.  
5 BY MR. CARVIN:  
6 Q. Right.  
7 A. So again with a different reference point, what something --  
8 what makes something relatively small or relatively large is  
9 going to change depending on that reference point.  
10 So that's the point I'm trying to clarify here,  
11 which is that when you're going to compare, say, the enacted  
12 plan's 5.19 percent, it's with reference to the distribution  
13 of simulated plans as measured by the same set of elections.  
14 Q. They go up to 4-and-a-half percent?  
15 A. Right.  
16 Q. So the difference between 4-and-a-half percent and 5.19  
17 percent you would view as substantively significant?  
18 A. Again, first I'm not -- I'm looking at the figures here and  
19 I'm not quite sure they go all the way up to 4-and-a-half  
20 percent. I can see they come sort of close.  
21 Q. It's your number on page 47.  
22 A. Okay. I appreciate that. I think they stop a little bit  
23 short.  
24 But the general point here is I don't really have  
25 an opinion on trying to, other than to say it's an

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1 apples-to-oranges characterization, I don't really draw any  
2 conclusions from trying to compare --  
3 Q. You don't?  
4 A. -- the median-mean gap using one set of elections in an  
5 enacted plan directly compared to a set of simulation  
6 calculations using another set of elections.  
7 Q. Well I'm --  
8 A. But I'm generally --  
9 Q. But --  
10 MR. YEAGER: We're going to stop until he can just  
11 answer.  
12 (At 4:55 p.m. went off the record.)  
13 (At 5:05 p.m. went on the record.)  
14 MR. CARVIN: Back on the record.  
15 BY MR. CARVIN:  
16 Q. If you'd turn to page 52 of your report, please.  
17 A. Yes.  
18 Q. As we alluded to previously you did a uniform swing analysis  
19 on the durability of the enacted plan's partisan bias, is  
20 that right?  
21 A. Yes.  
22 Q. Okay. And what you do in those circumstances is you ask what  
23 percentage statewide swing would be needed to give Democrats  
24 half the seats in each of the relevant bodies?  
25 A. That's right.

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1 Q. Okay. And basically what you're trying to figure out is  
2 whether a party -- I'm now quoting from the last paragraph on  
3 page 52, whether a party's majority control over a  
4 legislative chamber or congressional delegation is strong  
5 enough to withstand a reasonable range of alternative  
6 electoral conditions, right?  
7 A. I want to try to find that.  
8 Q. The last paragraph.  
9 A. First sentence, right, first, last paragraph.  
10 Q. Right.  
11 A. I see it, I gotcha.  
12 Q. What would be a reasonable range of alternative electoral  
13 condition in Michigan for the rest of the decade?  
14 A. It's not a question that I specifically analyzed. I didn't  
15 look at the distribution of all swings.  
16 I was simply characterizing the swing that would be  
17 necessary to flip or to tie the partisan control of each  
18 chamber.  
19 Q. Well if you turn to the last sentence on page 53, you do  
20 state that this Republican majority control would also have  
21 been durable even under a reasonable range of alternative  
22 electoral conditions.  
23 So what did you mean by a reasonable range of  
24 electoral conditions in that sentence?  
25 A. Well like I said, I didn't characterize it as a precise

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1 threshold. I just calculated the various swings that were  
2 necessary.  
3 Q. Right.  
4 A. I reported those swings on Table 5.  
5 Q. Right. But I'm trying -- please.  
6 A. Okay. Okay. I reported the numbers on Table 5. And I don't  
7 mean reasonable range in any precise sense other than to say  
8 that certainly they all are negative swings that are  
9 necessary. And they're certainly all larger, at least a  
10 little bit larger than one percent, and often several more  
11 than one percent.  
12 I didn't take -- I didn't take a particular  
13 threshold and say, if it's above one percent or if it's above  
14 two percent, that would be a larger swing or a smaller swing.  
15 Q. Would 3 to 5 percent be a reasonable swing?  
16 A. It really depends on the context. I would need to have more  
17 specific information.  
18 Q. In Michigan.  
19 A. Right. I understand.  
20 Q. In 2018, would a 3 to 5 percent swing be reasonably expected  
21 or quite unreasonable?  
22 A. It's really not just a question I analyzed.  
23 Q. So you don't know. How about 7 or 8 percent?  
24 A. Same answer there. I mean it's context dependent even  
25 depending on the specific set of elections that we're talking

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1 about, but again I'm saying it's not something that I  
2 analyzed.  
3 Q. Okay. If you'd turn to page 65, please.  
4 A. Okay.  
5 Q. This is the, your table showing the past statewide results,  
6 right, Congress, etcetera?  
7 A. Yes, I see this.  
8 Q. Okay. You can see for example in one election between 2008  
9 and 2010 the Republican vote share went from 45.65 to 54.15.  
10 Right?  
11 A. I see that.  
12 Q. Okay. So we had a 9 percent -- or 8-and-a-half percent swing  
13 in one election cycle. Is that unusual?  
14 A. Well what you did to get to that 9 percent or 8 percent or so  
15 is to take the difference between 2010 to 2008.  
16 Q. Right.  
17 A. That's not necessarily what's -- what you're doing in any  
18 sort of uniform swing analysis all the time.  
19 Obviously this is an unusual pair of elections in  
20 that in general the Democrats did quite well in 2008, and in  
21 general the Republicans did quite well in 2010. There were  
22 extreme partisan tides in the opposite directions, but that's  
23 not to say that certainly a one election to the next swing of  
24 8 percent is to be commonly expected. That was an unusual  
25 pair of elections back to back.

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1 Q. Well what about the next election after that? What happened  
2 then?  
3 A. What happened from --  
4 Q. In 2010.  
5 A. From 54 to 47 --  
6 Q. After we go from 55 to 44 we go from 54 to 47 in the next  
7 election cycle. So you have an 8-and-a-half percent swing  
8 and then a 7 percent swing back to back.  
9 A. And you're asking me --  
10 MR. YEAGER: Object, it's not 7 percent.  
11 THE WITNESS: 47.6 percent I think is what you're  
12 trying so say.  
13 Sure. So I'll answer with respect to that.  
14 I mean that actually brings a different set of  
15 factors in because obviously what happens in 2012 was not  
16 just a change from the 2010 Republican tide year, but there  
17 was obviously also redistricting. So you have a different  
18 set of Congressional races that are factoring into the number  
19 that's being reported there.  
20 So the point is if you just want -- if you're just  
21 asking is the math correct, certainly there is a swing there  
22 that is something on the order of 6 or 7 percent or so. But  
23 the point here is that there are obviously factors that go  
24 into making it not-terribly reliable just to say let's look  
25 at the difference from 2010 to 2012 or from '08 to 2010, and

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1 characterize that as a typical or not typical uniform swing.  
2 BY MR. CARVIN:  
3 Q. Well let's go back to Table 5 on page 57.  
4 A. Okay.  
5 Q. All right. We see here, if there is a uniform swing of as  
6 little as 3.37 percent from the 2012 year, then Democrats  
7 will win at one-half of the Congressional districts.  
8 Are you opining that a 3.37 diminution in  
9 Republican votes share in 2018 or 2020 is unlikely?  
10 MR. YEAGER: Objection, vague and ambiguous.  
11 You may answer.  
12 THE WITNESS: Okay. I'm not giving an opinion as  
13 to whether in general a 3.37 percent swing in the Democratic  
14 direction is, as an absolute matter categorically likely or  
15 unlikely. It's certainly context dependent.  
16 To give a more concrete example, let's suppose we  
17 had a really good Republican year, a historically good  
18 Republican year, whatever the vote share was in that year.  
19 How likely is it that in the next election the Republicans  
20 would do even better and have another 3 percent swing in the  
21 Republican direction?  
22 Well knowing that the benchmark for that was an  
23 already good Republican year, that's probably less likely.  
24 But let's suppose the converse, that we just had a  
25 really good Democratic year, an historically good Democratic

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1 year. How likely is it that in the next election, from this  
2 previous really good Democratic year, will we have a swing of  
3 3 percent in the Republican direction.  
4 That's obviously a lot more likely. That's what I  
5 mean when I say it's context dependent. There is no absolute  
6 answer when you're trying to compare one election to the  
7 next --  
8 BY MR. CARVIN:  
9 Q. So you're not opining that a 3.37 percent swing from the  
10 Republican vote share in November of 2012 is outside of the  
11 range of reasonable alternative electoral conditions for 2018  
12 and 2020, correct?  
13 MR. YEAGER: Please finish your prior answer,  
14 Professor, unless he withdraws the question.  
15 THE WITNESS: Okay. I'll finish what I was saying  
16 before and then I'll let you ask your next question.  
17 My point was just generally that it's context  
18 dependent. And certainly the sort of reasonable swings from  
19 a prior election, which is what you were just asking me about  
20 that one can expect, depends on whether that prior election  
21 was a really good Republican year or really good Democratic  
22 year or a neutral year, or whatever.  
23 That's the point when I say -- that's what --  
24 that's the basis of why I'm saying you can't just give an  
25 absolute answer as to this is or is not a large or reasonable

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1 conditions in 2018 or 2020, correct?  
2 **A. With respect to the 2018 elections and the 2020 elections, I**  
3 **am not even forecasting what those elections would, results**  
4 **would be. So I'm obviously not going to be able to opine on**  
5 **a specific prediction about what kind of uniform swing we**  
6 **might or might not see. That goes back to election**  
7 **forecasting.**  
8 Q. Right. So you're not making any prediction as to whether or  
9 not, in any of the three seats, whether or not Democrats  
10 will -- whether Republicans will retain majority control  
11 under reasonable alternative electoral conditions?  
12 **A. In any of the three seats?**  
13 Q. Any of the three chambers at issue.  
14 **A. Any of the three chambers?**  
15 Q. Sure.  
16 **A. Okay. Am I making a prediction as to whether the Democrats**  
17 **would win one-half or the Republicans would retain control?**  
18 **I mean that's a separate question. And again I**  
19 **would say that the same caveat as before, I'm obviously not**  
20 **forecasting specific 2018 election outcomes. But in**  
21 **expectations, we would certainly not expect the Democrats**  
22 **under the current districting plans to win one-half of the**  
23 **current districts in any of those three plans.**  
24 Q. Now I have to ask the same question again.  
25 So you're saying you certainly would not expect a

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1 uniform swing.  
2 BY MR. CARVIN:  
3 Q. And you haven't analyzed any of the contextual factors that  
4 would affect the swing in 2018 or 2020, right?  
5 **A. I haven't analyzed the 2018 elections at all so I'm not**  
6 **making any predictions or saying what sort of uniform**  
7 **swing --**  
8 Q. So you're not opining that a 3.37 percent uniform swing is  
9 outside the range of reasonable alternative electoral  
10 condition in 2018 or 2020, correct?  
11 **A. Swing compared to what? Are you talking about a swing from**  
12 **2016?**  
13 Q. 2012.  
14 **A. Oh. From '12. So you're saying would the difference between**  
15 **the 2012 to 2018 elections, could we see a 3.37 percent**  
16 **uniform swing? That's the question, right?**  
17 Q. Yes.  
18 **A. And I haven't specifically analyzed that. In part because**  
19 **again, to go back to my earlier answer, I'm not an elections**  
20 **forecaster here. I'm not making a specific prediction about**  
21 **what is the probability that we'll see a particular outcome**  
22 **in the specific 2018 or specifically the 2020 election.**  
23 Q. And since you haven't analyzed it you are not opining that a  
24 3.37 percent uniform swing from the 2012 election results is  
25 outside the range of reasonable alternative electoral

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1 3.37 percent uniform swing from the 2012 election results in  
2 Congress in either 2018 or 2020?  
3 **A. I think that's the same question that I just answered so I'm**  
4 **going to answer that question as I understood it.**  
5 **And again what I'm saying here is I'm not making a**  
6 **specific election forecast about 2018. But again, in the**  
7 **long term, in the long-run expectation over any number of**  
8 **elections, we normally don't expect to see such a uniform**  
9 **swing of a negative 3.37 percent.**  
10 Q. You don't? Why is that? What's the average swing throughout  
11 a decade in state legislative races?  
12 **A. I'm not sure I could tell you that off the top of my head.**  
13 **I'd need a definition of what you're talking about. Are you**  
14 **talking about the change from '12 to '14? Something like**  
15 **that?**  
16 Q. Throughout the decade, what kind of changes in either  
17 direction is typical in the majority of state legislative  
18 elections?  
19 MR. YEAGER: Objection, vague and ambiguous.  
20 You can answer.  
21 BY MR. CARVIN:  
22 Q. Do you know?  
23 **A. It's not something I can tell you off the top of my head.**  
24 Q. What's the range?  
25 **A. Same answer as before. I don't have those numbers in front**

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1 of me to give you precise numbers.  
2 Q. So you don't know if 3.37 percent is well within the expected  
3 range of swings, correct?  
4 A. What I am saying here is that over the long-term average we  
5 don't expect to see -- in long-term expectation we don't see  
6 it. And obviously again I'm not saying with respect to a  
7 particular election we will or will not see uniform swing of  
8 a particular size.  
9 If what you mean by uniform swing is the change  
10 from say '12 to '14, or the change from '14 to '16, that's a  
11 specific -- that's another specific definition of a uniform  
12 swing, and certainly we have the numbers in front of us here  
13 to at least characterize a little bit of what those swings  
14 have been under the current decade.  
15 But that's a different analysis altogether.  
16 Q. What is your reasonable expectation in the long term for  
17 whether or not there will be a 3.37 percent uniform swing  
18 from the 2012 Congressional election results?  
19 A. I'm not sure I understand the question.  
20 Q. You keep saying that you're not making any forecast for 2018  
21 or 2020, you're talking about long-term expectations. What  
22 is your long-term expectation for a likely or reasonable  
23 uniform swing from 2012 election results for Republicans?  
24 A. Okay. My answer is going to be that I haven't done that  
25 specific study.

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1 Q. All right. And can you turn to page 57?  
2 A. Okay.  
3 Q. Okay. For the State Senate, you say they need a 6.4 percent  
4 uniform swing, for Democrats to win one-half of the Senate  
5 districts, correct?  
6 A. We're talking about November 2014 Congressional --  
7 Q. Right.  
8 A. -- second row? Yes, I see the 6.45 percent.  
9 Q. And November of 2014 was an excellent year for Republicans in  
10 the Senate, right? Your statewide excellent predictor of  
11 seats predicted 23 or 24, when in fact they won 27, is that  
12 right?  
13 A. Okay. We're talking about the State Senate elections now.  
14 I agree that the November 2014 elections were good  
15 for the Republicans.  
16 Q. Is it an unreasonable alteration in electoral conditions that  
17 there will do 6.4 percent worse in any elections during this  
18 decade?  
19 THE WITNESS: Could I have that read back?  
20 (Record read: Q. Is it an unreasonable  
21 alteration in electoral conditions that there will do  
22 6.4 percent worse in any elections during this decade?)  
23 THE WITNESS: I think it's fair to say that that  
24 would be a fairly large gap to overcome. Again, I'm not  
25 forecasting to say that it could never happen. I'm just

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1 saying that in general in expectations we don't expect a  
2 uniform swing that large.  
3 BY MR. CARVIN:  
4 Q. Who is we? Why don't you expect that?  
5 A. Sure. Obviously by we I'm speaking for myself here.  
6 Q. You haven't analyzed the issues so how can you have  
7 expectations one way or the other?  
8 A. Sure. I'm saying I haven't precisely calculated a threshold  
9 for each particular set of elections showing a distribution  
10 of what sort of uniform swings we would or would not expect.  
11 And this is just based on my general looking at  
12 election results in Michigan, which I'm not saying that I've  
13 done a specific study to calculate a threshold.  
14 Q. Well what's been the most recent history in the Senate in  
15 terms of swings statewide?  
16 A. You're asking about a swing from one election to the next?  
17 Or you're asking from a long-term average?  
18 Q. Either.  
19 A. I don't have the data here in front of me to be able to give  
20 you any sort of precise number.  
21 Q. Turn to page 65, please.  
22 Again we see, do we not, between 2006 and 2010, in  
23 one election cycle we see a nearly 9 percent increase in  
24 Republican vote share?  
25 A. Okay, I got you. You're pointing to the second part of this

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1 table here.  
2 Q. Right.  
3 A. So I appreciate that you're pointing me to some actual  
4 election data here. And, sure, I can affirm your math that  
5 from say '06 to 2010 there is a swing of something almost  
6 like 9 percent. That's not necessarily how I would answer  
7 the question of what sort of uniform swings we would expect.  
8 So I think your question was just about the math,  
9 so I'll stop there because I think I answered your question.  
10 Q. Okay. But you haven't analyzed swings in any way for State  
11 Senate elections in Michigan, right?  
12 A. I wouldn't say I haven't analyzed them in anyway. I haven't  
13 analyzed it specifically with an eye towards answering the  
14 question that, about what is or is not a reasonable uniform  
15 swing.  
16 I mean I think in general one wouldn't do so by  
17 saying, well, look, we've got a change from '06 to 2010 of  
18 about 9 percent, so clearly that's typical. That wouldn't  
19 really be the appropriate way to do it.  
20 You might do something like looking at the  
21 long-term average.  
22 Q. And -- go ahead.  
23 A. Okay. I was just going to say one might look at the  
24 long-term average --  
25 Q. But you haven't looked at the long-term average, have you?

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1 A. Okay, I'm just going to finish answering the previous  
2 question. And then I'll try to remember this question.  
3 So one might do something like looking at the  
4 long-term average, and then saying what were the swings  
5 during individual elections from that long-term average, and  
6 what range was actually possible, or what ranges were  
7 observed.  
8 And then I think your next question was whether  
9 I've done that, and obviously I said, no, I haven't  
10 specifically done that.  
11 Q. Okay. If I ask you what you've looked at, it would be very  
12 helpful because we're particularly short on time, if you  
13 could answer that question, rather than hypothesize what one  
14 could do. Is that okay?  
15 A. All right. I appreciate that.  
16 Q. Thank you. If you could turn to page 57?  
17 A. (Witness complied.)  
18 Q. Okay. Now the uniform vote swing we need to give Democrats  
19 one-half of the House districts, if you look at 2012 would be  
20 a change of one percent -- 1.04 percentage points.  
21 Are you going to opine that a swing of 1.04  
22 percentage points from the results in 2012 is outside the  
23 range of reasonable alternative electoral conditions in 2018  
24 or 2020?  
25 A. Well the point here is that it hasn't happened. We've seen

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1 three election results and it hasn't happened. And the same  
2 qualification before in that I'm not opining that in general  
3 a particular uniform swing is or is not likely. It's always  
4 context dependent here. But certainly we haven't seen such a  
5 uniform swing from the 2012 election results.  
6 That is not to say, however, that one would never  
7 expect to see a 1.04 percent uniform swing from some election  
8 result. That, again, is another separate -- is a different  
9 question altogether.  
10 But specifically from the 1.04 percent listed there  
11 in November of 2012 row, we haven't seen 1.04 percent swing.  
12 Q. We haven't? Well let's turn to page 65 again, right?  
13 You're saying, I take it, we haven't seen that  
14 swing in 2014 and 2016, was that your point?  
15 A. We haven't seen the swing from the 2012 result is what I was  
16 saying.  
17 Q. From meaning since?  
18 A. No. No. No. No. From meaning take the results of the 2012  
19 and subtract 1.04 percent from every district. That's what I  
20 mean by from 2012 .  
21 I'm not saying was there such a change from '14 to  
22 '16. Obviously there have been swings from one election to  
23 the next larger than 1.04 percent. That's goes without  
24 saying.  
25 Q. Right. For example from between 2010 and 2012 they lost,

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1 what, roughly 7 percent in one election cycle?  
2 A. That's right. 2010 was a really strong Republican year.  
3 Q. Right.  
4 A. And then 2012 was kind of a strong Democratic year.  
5 Q. Right. And if 2016 was a strong Republican year and 2018 was  
6 a strong Democratic year, there is no reason not to expect a  
7 swing of equal magnitude, or certainly more than the one  
8 percent, right?  
9 A. And now we're talking about swings from one election to the  
10 next, and you're specifically talking about the 2016  
11 election.  
12 Q. Right.  
13 A. We're no longer talking about the 2012 election where that  
14 1.04 percent number came from.  
15 Q. Right.  
16 A. And I agree with you that certainly 2016 was obviously a  
17 pretty good Republican year. And if, very hypothetically,  
18 there were to be a strong Democratic year next, then  
19 certainly we may very well expect a swing of over 1.04  
20 percent.  
21 Q. Well let's look at page 57.  
22 In this very good Republican year of November 2016  
23 a swing from 4 percent, just 4 percent between that and 2018  
24 would give Democrats one House -- one-half of the House  
25 districts. You are not opining in any way I take it that a 4

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1 percent negative swing against Republicans is at all unlikely  
2 from 2016 to 2018, is that right?  
3 A. Did you say unlikely?  
4 Q. Yes. Is at all unlikely.  
5 A. Is at all unlikely.  
6 I'm not sure that I've done the analysis to be able  
7 to specifically answer this. I haven't done the analysis to  
8 be able to specifically answer that.  
9 But I'm just pointing out that was a very different  
10 question from asking whether a particular uniform swing from  
11 the 2012 results was likely.  
12 Q. Now the response to my different question is that you've done  
13 no analysis and cannot opine whether it's likely or unlikely  
14 that Republicans will get 4 percent less statewide vote than  
15 they got in 2016, right?  
16 A. I agree it's not something I've specifically analyzed.  
17 Q. Or analyzed in general?  
18 A. Well I've generally looked at election results, but I'm  
19 agreeing that I have not specifically analyzed the question  
20 that you posed to me.  
21 Q. And you're asking the question how much would it take to give  
22 Democrats one-half of the House district. Right?  
23 A. In the bottom --  
24 Q. In the House.  
25 A. Okay, I gotcha.



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1 Q. Why would you ask that question when the non-simulated plans  
2 give Republicans roughly 58 percent -- 58 of the House  
3 districts? Isn't the relevant question what swing is  
4 necessary to return them to what occurred under the simulated  
5 plans?  
6 **A. I'm not sure -- you just said in your question when the**  
7 **non-simulated plans gave the Republicans 58.**  
8 Q. I'm sorry, if I said -- let me rephrase the question.  
9 As we discussed at length the vast majority of the  
10 nonpartisan simulated plans would have given Republicans 58  
11 seats under the way you analyzed that. If that is true,  
12 shouldn't we ask ourselves what would the vote swing be  
13 necessary to give Republicans 58 seats instead of 55 seats?  
14 **A. Okay. I gotcha.**  
15 **I agree that there is a possibility, or one can do**  
16 **that, as a purely statistical matter. You can certainly take**  
17 **districts from a simulated plan, analyze them using statewide**  
18 **elections, and then apply various uniform swings to see what**  
19 **the effect on the number of Republican seats would be.**  
20 **I didn't do that analysis here. That analysis**  
21 **wasn't appropriate for the question that was put forth to me**  
22 **here. So that's why I didn't do it here.**  
23 Q. All right. The uniform swing analysis assumes an equal swing  
24 in every district, right?  
25 **A. That's essentially what it does. You're applying various**

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1 **hypothetical swings at an equal percentage in every district.**  
2 Q. Right. And your touchstone for when they achieve half of the  
3 House districts or half of the Senate districts or half of  
4 the Congressional districts looks at the vote needed in the  
5 median district to turn Democrat, right?  
6 **A. If I could ask --**  
7 Q. You're looking at the median district percentage, right?  
8 **A. I gotcha. You're saying for the purposes of calculating**  
9 **whether or not Democrats are going to be able to win**  
10 **one-half.**  
11 Q. Right.  
12 **A. It's not quite -- I get why you're saying that. It's not**  
13 **quite literally the median district. And it's just a small**  
14 **technical thing, you can feel free to cut me off if you don't**  
15 **want to hear the technical explanation.**  
16 **When I say one-half of the House districts or**  
17 **one-half of the Congressional districts in this table, I'm**  
18 **saying 55 out of 110, or seven out of 14 of the Congressional**  
19 **districts.**  
20 **To win that you don't literally need to win the**  
21 **median district. The median district is statistically**  
22 **calculated as, for the House plan, the mid point between 55**  
23 **and 56. Just a small technical point. That's what we mean**  
24 **by the median. That's just statistically how you calculate**  
25 **the median.**

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1 **To calculate the median Congressional district,**  
2 **you're calculating the midpoint between number seven and**  
3 **number eight.**  
4 Q. You're looking at the vote swing necessary in the 7th  
5 district, the 7th most --  
6 **A. For the Congressional plan that's what's going on here in**  
7 **this figure.**  
8 Q. Okay.  
9 **A. It's the 7th ward, in the House, it's the 55th.**  
10 Q. Isn't it true that the vote swings in the most competitive  
11 districts in state tend to change more than the statewide  
12 average?  
13 **A. That is not a question I have analyzed in the context of**  
14 **these districts.**  
15 Q. Doesn't it make sense that if elections are competitive, the  
16 Democrats, the Republicans are going to be putting a lot more  
17 resources and candidate recruitment into those districts that  
18 are winnable, than they would in either safe Republican or  
19 safe Democratic districts in order to achieve a majority?  
20 **A. That is not a question that I've analyzed in my work here.**  
21 Q. Have you thought about it?  
22 I'll just ask you generally. Do parties put more  
23 money into competitive elections that will swing a  
24 legislative body in their favor than they do into safe seats  
25 that will have no effect on whether or not the body swings?

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1 You haven't looked at that?  
2 **A. Again I'm going to say that's outside of my expertise.**  
3 **I'm obviously aware of that as a general strategy.**  
4 **I can't say that's within my expertise to say that's a**  
5 **general pattern that's happening in Michigan.**  
6 Q. Okay. If you could turn to page 56, please.  
7 Okay. On page 56 you analyzed -- you say that  
8 Congressional Districts 1, 4, 5, 8, 9, 10, 11 and 12 are  
9 partisan outliers?  
10 **A. I see that paragraph there.**  
11 Q. Okay. And you conclude from that these are the most  
12 effectively cracked and packed districts in the enacted maps,  
13 on page 56?  
14 **A. Where are you referring to on 56?**  
15 Q. The last paragraph.  
16 **A. Right. Just with the same caveat that I was just**  
17 **operationalizing those terms cracking and packing in the way**  
18 **we discussed at length earlier today.**  
19 Q. I'm just trying to figure out -- we can go through the  
20 appendix. As I understand it, you looked at -- well, maybe  
21 it will be helpful to look to -- go to Appendix D5 and D3 on  
22 page 74 and 75, okay? Do have that in front of you?  
23 **A. Yes, sir.**  
24 Q. First one is titled Comparison of Each Enacted Plan District  
25 to the District that Geographically Overlaps Most with the

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1 Enacted District. And then D3 is a Comparison of the Enacted  
2 Plan District to Simulated District Containing at least 50  
3 Percent of the Enacted District's Population.  
4 I assume from your report that your judgement on  
5 the packing and cracking that we just talked about was based  
6 on the comparison with the 50 percent of the enacted  
7 district's population, not based on the one that  
8 geographically overlaps most, but tell me if I'm wrong.  
9 **A. That is my recollection of what I did, it was Appendix D3 is**  
10 **the one we're talking about here.**  
11 Q. Right.  
12 **A. That's my recollection. I think I spelled out somewhere in**  
13 **the report exactly what I was -- which figure we were looking**  
14 **at.**  
15 Q. Right. And I'm trying to save time, but stop me if you need  
16 to.  
17 As I understood it what you did is you said it was  
18 a partisan outlier and packed and cracked, and was outside  
19 that middle 95 percent range that we talked about comprising  
20 the districts where you have a 50 percent overlap in  
21 population.  
22 **A. I think that's basically right. I was constructing the 95**  
23 **percent interval.**  
24 Q. Yes.  
25 **A. And then asking whether or not the enacted district in each**

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1 **of these rows was inside or outside of that 95 percent**  
2 **interval.**  
3 Q. Okay. So let's look at D3 in your appendix, D3, okay. And  
4 you may have to go back, I apologize, to make sure I'm not  
5 misleading you. But you listed District 1 on page 56 as one  
6 of these partisan outliers. You can keep going back if you  
7 need to, it's page 56.  
8 **A. I gotcha.**  
9 Q. So I want to ask you some questions about CD-1.  
10 The only thing I see on your graph there is a more  
11 Republican district, a somewhat safer Republican district.  
12 Why would that be a packed or cracked partisan outlier? Am I  
13 misunderstanding? The star is the enacted plan district,  
14 right?  
15 **A. Correct.**  
16 Q. And the thing to its right, meaning more Republican, is the  
17 50 percent of the enacted plan -- the simulated plans that  
18 overlap by 50 percent.  
19 So how could CD-1, if it's less Republican, be a  
20 pro-Republican district?  
21 **A. Okay. Well all I'm doing here as I said a moment ago is I am**  
22 **just looking at -- and this is a purely technical exercise.**  
23 Q. Okay.  
24 **A. I'm just looking at the middle 95 percent range. And I'm**  
25 **just asking is that red star representing the enacted**

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1 **Congressional District 1, each Congressional district here,**  
2 **is it inside or outside of that range. And if it's outside,**  
3 **I'm listing that in that paragraph.**  
4 Q. Okay.  
5 **A. And all I meant to say is I didn't -- I obviously didn't**  
6 **intend to, and I apologize if I accidentally misled you with**  
7 **that paragraph regarding the partisan direction of that. I**  
8 **simply said what's a 95 percent interval, and if it was**  
9 **outside of that, then it would be listed.**  
10 Q. All right. So I had a lot of those questions along those  
11 lines, but I'm again going to cut to the chase with you.  
12 If I understand what you just said correctly, if  
13 the enacted plan is outside of the range represented by  
14 these, I don't know what else to call it, the concentrated  
15 circles, I don't want to call them blobs, but if they're  
16 outside of that, then that's the decision-making process that  
17 led you to include them among the districts that you  
18 categorized as partisan outliers; whereas if the star appears  
19 within those districts, within the blobs, then you don't  
20 characterize them that way?  
21 **A. That's basically right. Again, it is a purely statistical**  
22 **exercise here. And obviously you and I talked quite a bit at**  
23 **length earlier today about how I was attempting to just**  
24 **operationalize, even though I don't have a particular**  
25 **scientific understanding of the terms cracking and packing, I**

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1 **just took a very specific statistical identification here**  
2 **where I said, what's the 95 percent interval, that middle 95**  
3 **percent range, and is the enacted district within or outside**  
4 **of it.**  
5 **That's it. I just wanted to make sure that was**  
6 **clear.**  
7 Q. Okay. Well even in light of that, I thank you because that  
8 saved us a boat load of time.  
9 I'm still a little confused.  
10 If you could turn to Appendix D6 on page 78, right?  
11 And again, check me on page 56, but I think you list District  
12 8 as one of these partisan outliers, that Senate District 8  
13 if you want to check me on page 56?  
14 **A. On 56.**  
15 Q. I'm representing to you that you listed SD-8 as one of the  
16 partisan outliers. If you want to check my veracity you can  
17 look at page 56 and see if I got that right.  
18 **A. I gotcha.**  
19 Q. So now I have a question about SD-8 based on the thing on  
20 page 78.  
21 I would have thought that that circle would have  
22 been between the two blobs, so it wouldn't have been a  
23 partisan outlier under the mechanistic view that you just  
24 described. So how did SD-8 wind up on this list?  
25 **A. Right. I think what you're saying is you're seeing two**

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1 distinct blobs.  
2 Q. Yes.  
3 **A. And you can't understand why 95 percent of them would be on**  
4 **one side rather than the other. And I get where you're**  
5 **coming from.**  
6 Q. Right.  
7 **A. The answer again is I actually did just construct a middle 95**  
8 **percent interval. And I realize that it's difficult to**  
9 **concern how many circles are here, and obviously I don't have**  
10 **the data file in front of me here to be able to prove it to**  
11 **you or verify it right in front of us. But again what I did**  
12 **here --**  
13 Q. So your --  
14 **A. Let me just --**  
15 Q. Sure.  
16 **A. What this figure is doing is just stacking a bunch of gray**  
17 **circles on top of each other, and often it's in a very close**  
18 **cluster.**  
19 **It is actually really to be able to look at one of**  
20 **these clusters and be able to discern and accurately estimate**  
21 **whether that's several hundred or just 50 or 20 or so**  
22 **circles. That's why it's probably -- it's not a safe bet to**  
23 **try to just look at the blobs and try to estimate out those**  
24 **numbers.**  
25 **But again what I'm saying what I did was I actually**

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1 this table. But I didn't see you attach any significance to  
2 ranking the Congressional plans or the other plans' districts  
3 aligned from least to most Republican. Is that part of your  
4 cracking or packing analysis? Is this part of that?  
5 **A. It's a different sort of analysis just looking at outliers.**  
6 **And since you asked about packing and cracking obviously I'm**  
7 **giving the same caveat as before, I don't understand those**  
8 **terms in any sort of scientific, precise, objective way.**  
9 **But this Appendix D1 figure is just generally part**  
10 **of my analysis of district-by-district outliers. And it's**  
11 **just configured in a slightly different way where I'm lining**  
12 **up the districts from least to most Republican within each**  
13 **plan. So that's a little bit different than the figures that**  
14 **you and I were just talking about a moment ago because now**  
15 **we're not looking at, say, the simulated districts that**  
16 **geographically overlap with an active Congressional district,**  
17 **but instead we're looking at the most Democratic district at**  
18 **the very bottom. Then we're looking at the second most**  
19 **Democrat district on the second row. In the third row, we're**  
20 **looking at the third most Democratic district, and so on.**  
21 **So it's just a somewhat different basis of**  
22 **comparison for looking at partisan outliers in this form.**  
23 Q. All right. If you could turn to page four of your report,  
24 please.  
25 MR. YEAGER: Page four?

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1 **did calculate the middle 95 percent range. And just because**  
2 **you see a blob there doesn't necessarily mean -- on the left,**  
3 **doesn't necessarily mean it's as big as the blob on the**  
4 **right.**  
5 Q. Right. I guess you're going to give me the same answer if  
6 you look at SD-27 real quickly?  
7 The star is within the blob, but it's at the far  
8 end. So I take it the reason that's identified as an outlier  
9 is it's outside the 95 percent middle range?  
10 **A. Right. Same answer as before.**  
11 Q. Same answer?  
12 **A. Obviously I don't have the data here to verify it right here**  
13 **on the spot.**  
14 Q. Right.  
15 **A. But you see that blob and it's hard to precisely discern are**  
16 **there really a lot of gray circles at the very left hand, or**  
17 **just a small number. But my calculation was take that middle**  
18 **95 percent range.**  
19 Q. Okay. And then if you could turn quickly to Appendix D1,  
20 please.  
21 **A. (Witness complied.)**  
22 Q. Okay.  
23 **A. Let me just get there. I gotcha.**  
24 Q. So in this one you -- and again I'm trying to cut to the  
25 chase here. You mentioned this in your report, you present

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1 MR. CARVIN: Four.  
2 BY MR. CARVIN:  
3 Q. The only reason I'm directing you to this is the last  
4 paragraph where you say, the algorithm freezes the enacted  
5 plan's boundaries of House Districts 1 through 10. Do you  
6 see that in the fourth paragraph there?  
7 **A. Yes, I see that.**  
8 Q. And that's consistent with your recollection, you froze House  
9 Districts 1 through 10?  
10 **A. Yes, there was more than that. But House Districts 1 through**  
11 **10 were certainly frozen.**  
12 Q. Okay. And then if you look at HD-2, okay, turn to page 80  
13 I'll represent to you that all the other House -- we talked  
14 about Flint before, but the other ones, HD-1 through 10 you  
15 just see one star and one blob around it, and I assume that's  
16 the consequence of the freeze?  
17 **A. Yes.**  
18 Q. But if you go to HD-2, you see the star at the far end of a  
19 big blob, which suggests to me that there was alternative  
20 versions of HD-2. But please explain.  
21 **A. No, that's not correct. You were correct all the way up**  
22 **until the end, so I'll clarify where the misunderstanding I**  
23 **think on your part came from.**  
24 Q. Okay.  
25 **A. So we're on Appendix D8, right? I just want to make sure.**

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1 Q. Right.  
2 **A. So HD-2, the row for HD-2 is the 17th row from the bottom,**  
3 **you see that, right?**  
4 Q. Yes.  
5 **A. So what that means is HD-2 in the enacted plan is the 17th**  
6 **most Democratic district ranked by Republican -- by partisan**  
7 **vote share. And that is how I ordered the enacted districts**  
8 **along the vertical axis of this figure.**  
9 **Now I rank ordered the districts in the simulated**  
10 **plans, the one thousand simulated plans, using exactly that**  
11 **same measure ranked from --**  
12 Q. Please finish.  
13 **A. I'm happy to interrupt my explanation there.**  
14 Q. Because I'm just going to confirm if I do have it. If you  
15 look at appendix D-4 on page 76?  
16 **A. Okay. Let me get to where you are.**  
17 Q. Do you have that?  
18 **A. Yes, sir.**  
19 Q. Okay. I'm going to ask you to trust me that you said you  
20 froze SD-6 and SD-7, and you had the same kind of  
21 configuration that I just identified for the House district.  
22 I take it your explanation for SD-6 and SD-7 is  
23 essentially the same you just gave me for the House district,  
24 why there is blobs and all that because this is a rank  
25 ordering exercise?

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1 MR. CARVIN: Can you give me one second?  
2 (At 5:50 p.m. went off the record.)  
3 (At 5:50 p.m. went on the record.)  
4 MR. CARVIN: For your sake as well as my own, I  
5 want to end this pleasant exercise. We have no further  
6 questions.  
7 THE WITNESS: Thank you, sir.  
8 (Deposition concluded at 5:51 p.m.)  
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1 **A. Right. Same thing again. So there SD-6, you see that's the**  
2 **tenth row from the bottom, that means SD-6 is listed there**  
3 **along with those gray circles as the tenth most Democratic**  
4 **district in each enacted and simulated plan.**  
5 **So all those gray blobs, all the gray circles that**  
6 **you see on that tenth row, those are not referring to**  
7 **simulated districts in the same geographic area as SD-6,**  
8 **instead they're referring to the tenth most Democratic**  
9 **district.**  
10 Q. Whatever -- and it's undoubtedly not the same number, it's a  
11 different number. Whatever it is, it just happens to be the  
12 tenth most in your example?  
13 **A. Right. So SD-6, even though it's frozen in every plan, is**  
14 **not necessarily the tenth most Democratic district in each**  
15 **plan.**  
16 Q. I'll try it one last time to make sure I got it straight.  
17 You're not comparing SD-6 in the enacted plan to the  
18 simulated plans, you're comparing SD-6 in the enacted plan to  
19 whatever district corresponds with it in the rank ordering of  
20 Democratic and Congressional districts?  
21 **A. Exactly.**  
22 Q. Right.  
23 **A. That district may well be in a completely different part of**  
24 **the state.**  
25 Q. Okay.

1 CERTIFICATION OF COURT REPORTER AND NOTARY PUBLIC

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3

4 STATE OF MICHIGAN )

5 ) SS

6 COUNTY OF MUSKEGON )

7

8 I certify that this transcript, consisting of 281  
9 pages, is a complete, true and correct record of the  
10 testimony of JOWIE CHEN held in this case on September 7,  
11 2018.

12 I also certify that prior to taking this deposition  
13 JOWIE CHEN was duly sworn to tell the truth.

14

15

16 DATE: September 9, 2018

17

18

19 \_\_\_\_\_  
MARJORIE A. COVEY, CSR-2616  
141 East Michigan Avenue, Suite 206  
20 Kalamazoo, MI 49007  
1.800.878.8750

21

22 Notary Public Expires: October 14, 2021, Muskegon  
County, Michigan/Acting in the State of Michigan.

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